EOSDIS Core System Project

ECS Project Training Material
Volume 12: Configuration Management

March 1999

Raytheon Systems Company
Upper Marlboro, Maryland

ECS Project Training Material

Volume 12: Configuration Management

March 1999

Prepared Under Contract NAS5-60000
CDRL Item #129

RESPONSIBLE ENGINEER

Paul E. Van Hemel /s/   3/29/99
_____
Paul E. Van Hemel   Date
EOSDIS Core System Project

SUBMITTED BY

Gary W. Sloan for /s/   3/29/99
_____
Tom Hickey, M&O Manager   Date
EOSDIS Core System Project

Raytheon Systems Company
Upper Marlboro, Maryland

625-CD-012-002

This page intentionally left blank.

Preface

This document is a contract deliverable with an approval code of 3. As such, it does not require formal Government approval. This document is delivered for information only, but is subject to approval as meeting contractual requirements.

Any questions should be addressed to:

Data Management Office
The ECS Project Office
Raytheon Systems Company
1616 McCormick Dr.
Upper Marlboro, MD 20774-5301

This page intentionally left blank.

Abstract

This is Volume 12 of a series of lessons containing the training material for Release 4 of the Earth Observing System Data and Information System (EOSDIS) Core System (ECS). This lesson provides a detailed description of the different tasks that need to be accomplished in order to: record and manage proposed and approved Configuration Change Requests (CCRs); record, report, manage, and distribute changes to custom ECS software, science software, and database control files; record, report, and maintain system-level changes to the as-built operational baseline; and generate the Configuration Status Accounting Records (CSARs).

Keywords: training, instructional design, course objective, Configuration Management, Configuration Change Request, software changes, Configuration Status Accounting, Baseline Manager, Inventory/Logistical Management

This page intentionally left blank.

Change Information Page

List of Effective Pages	
Page Number	**Issue**
Title	Revised
iii through xii	Revised
1 through 80	Revised
Slide Presentation 1 through 50	Revised

Document History			
Document Number	**Status/Issue**	**Publication Date**	**CCR Number**
625-CD-012-001	Original	December 1997	
625-CD-012-002	Revised	March 1999	

This page intentionally left blank.

Contents

Preface

Abstract

Introduction

Related Documentation

Configuration Management Overview

M&O Role in ECS CM Activities

Configuration Control Boards (CCBs)

Configuration Change Requests (CCRs)

Impact Analysis

Software Baselines and Changes

Hardware Baselines and Changes

Changes to the Baseline

Practical Exercise

Slide Presentation

This page intentionally left blank.

Introduction

Identification

Training Material Volume 12 is part of Contract Data Requirements List (CDRL) Item 129, whose requirements are specified in Data Item Description (DID) 625/OP3 and is a required deliverable under the Earth Observing System Data and Information System (EOSDIS) Core System (ECS), Contract (NAS5-6000).

Scope

Training Material Volume 12 describes the processes and procedures for Maintenance and Operations configuration management (CM) of ECS. This lesson is designed to provide the operations staff with sufficient knowledge and information to satisfy all lesson objectives.

Purpose

The purpose of this Student Guide is to provide a detailed course of instruction that forms the basis for understanding Configuration Management   Lesson objectives are developed and will be used to guide the flow of instruction for this lesson. The lesson objectives will serve as the basis for verifying that all lesson topics are contained within this Student Guide and slide presentation material.

Status and Schedule

This lesson module provides detailed information about training for Release 4. Subsequent revisions will be submitted as needed.

Organization

This document is organized as follows:

Introduction:	The Introduction presents the document identification, scope, purpose, and organization.
Related Documentation:	Related Documentation identifies parent, applicable and information documents associated with this document.
Student Guide:	The Student Guide identifies the core elements of this lesson. All Lesson Objectives and associated topics are included.
Slide Presentation:	Slide Presentation is reserved for all slides used by the instructor during the presentation of this lesson.

This page intentionally left blank.

Related Documentation

Parent Document

The parent document is the document from which this ECS Training Plan's scope and content are derived.

423-41-01	Goddard Space Flight Center, EOSDIS Core System (ECS) Statement of Work

Applicable Documents

The following documents are referenced within this ECS Training Plan, or are directly applicable, or contain policies or other directive matters that are binding upon the content of this document:

420-05-03	Goddard Space Flight Center, Earth Observing System (EOS) Performance Assurance Requirements for the EOSDIS Core System (ECS)
423-41-02	Goddard Space Flight Center, Functional and Performance Requirements Specification for the Earth Observing System Data and Information System (EOSDIS) Core System (ECS)

Information Documents

Information Documents Referenced

The following documents are referenced herein and amplify or clarify the information presented in this document. These documents are not binding on the content of the ECS Training Plan.

102-CD-002	Maintenance and Operations Configuration Management Plan
609-CD-003	Operations Tools Manual for the ECS Project
611-CD-004	Mission Operations Procedures for the ECS Project
535-TIP-CPT-001	Goddard Space Flight Center, Mission Operations and Data Systems Directorate (MO&DSD) Technical Information Program Networks Technical Training Facility, Contractor-Provided Training Specification

Information Documents Not Referenced

The following documents, although not referenced herein and/or not directly applicable, do amplify or clarify the information presented in this document. These documents are not binding on the content of the ECS Training Plan.

220-TP-001	Operations Scenarios - ECS Release B.0 Impacts, Technical Paper for the ECS Project

305-CD-020	Release B SDPS/CSMS System Design Specification Overview for the ECS Project
305-CD-021	Release B SDPS Client Subsystem Design Specification for the ECS Project
305-CD-022	Release B SDPS Interoperability Subsystem Design Specification for the ECS Project
305-CD-023	Release B SDPS Data Management Subsystem Design Specification for the ECS Project
305-CD-024	Release B SDPS Data Server Subsystem Design Specification for the ECS Project
305-CD-025	Release B SDPS Ingest Subsystem Design Specification for the ECS Project
305-CD-026	Release B SDPS Planning Subsystem Design Specification for the ECS Project
305-CD-027	Release B SDPS Data Processing Subsystem Design Specification for the ECS Project
305-CD-028	Release B CSMS Communications Subsystem Design Specification for the ECS Project
305-CD-029	Release B CSMS System Management Subsystem Design Specification for the ECS Project
305-CD-030	Release B GSFC DAAC Design Specification for the ECS Project
305-CD-031	Release B Langley DAAC Design Specification for the ECS Project
305-CD-033	Release B EDC DAAC Design Specification for the ECS Project
305-CD-034	Release B ASF DAAC Design Specification for the ECS Project
305-CD-035	Release B NSIDC DAAC Design Specification for the ECS Project
305-CD-036	Release B JPL PO.DAAC Design Specification for the ECS Project
305-CD-037	Release B ORNL DAAC Design Specification for the ECS Project
305-CD-038	Release B System Monitoring and Coordination Center Design Specification for the ECS Project
305-CD-039	Release B Data Dictionary Subsystem Design Specification for the ECS Project
601-CD-001	Maintenance and Operations Management Plan for the ECS Project
604-CD-001	Operations Concept for the ECS Project: Part 1-- ECS Overview
604-CD-002	Operations Concept for the ECS Project: Part 2B -- ECS Release B

625-CD-012-002

605-CD-002	Release B SDPS/CSMS Operations Scenarios for the ECS Project
607-CD-001	ECS Maintenance and Operations Position Descriptions
500-1002	Goddard Space Flight Center, Network and Mission Operations Support (NMOS) Certification Program, 1/90

This page intentionally left blank.

Configuration Management Overview

Lesson Overview

This lesson will provide you with the process for Configuration Management (CM), including the Configuration Change Request (CCR) Process, the Configuration Change Board (CCB) process, software and hardware baselines and changes, and Configuration Status Accounting. It provides practical experience in using the tools you will need for processing CCRs, software transfer and installation, change control accounting, and baseline management.

Lesson Objectives

Overall Objective - The overall objective of this lesson is proficiency in the methodology and procedures for configuration management (CM) of the Earth Observing System Data and Information System (EOSDIS) Core System (ECS) during maintenance and operations.

Condition - The student will be given a baseline configuration for ECS, common CM tools, a copy of 609-CD-003-003 *Version 2.0 Operations Tools Manual*, a copy of 611-CD-004-004 *Mission Operation Procedures for the ECS Project*, and a requirement for a change to the baseline.

Standard - The student will use CM tools in accordance with prescribed methods and complete required procedures without error to accomplish all coordination and actions necessary to effect the required change.

Specific Objective 1 - The student will describe the M&O role in ECS CM activities.

Condition - The student will be given a timeline depicting major elements of ECS maintenance and operations.

Standard - The student will correctly identify the overall CM requirement and specific CM objective of M&O, and correctly list or state a specific M&O role in relation to each of the following: 1) the control of changes at operational sites, 2) the maintenance and operation of science software, and 3) the Sustaining Engineering Organization (SEO) CM function.

Specific Objective 2 - The student will list the CCBs involved in ECS CM, identify their inter-relationships, and list their responsibilities and functions in ECS CM.

Condition - The student will be given a copy of 609-CD-003-003 *Version 2.0 Operations Tools Manual* and a copy of 611-CD-004-004 *Mission Operation Procedures for the ECS Project*.

Standard - The student will identify the position of each CCB within the CCB hierarchy without error, and correctly list at least one major responsibility for each, and correctly list three functions of CM Administrators at SMC, EOC, the DAACs, and SCFs.

625-CD-012-002

Specific Objective 3 - The student will execute the procedure to record, report, document, and distribute a change request.

Condition - The student will be given a requirement for a hardware or software change, a copy of 609-CD-003-003 *Version 2.0 Operations Tools Manual*, a copy of 611-CD-004-004 *Mission Operation Procedures for the ECS Project*, and access to DDTS.

Standard - The student will use DDTS correctly to enter data documenting the request, print a report on the request, and identify without error the proper distribution for the report.

Specific Objective 4 - The student will prepare a request for impact analysis.

Condition - The student will be given a copy of 611-CD-004-004 *Mission Operation Procedures for the ECS Project* and a written description of a science software upgrade configuration change request.

Standard - The student will develop the request for impact analysis, correctly identifying all potentially affected elements of ECS to be analyzed, and use the Change Request Manager software correctly to ensure proper distribution for the impact analysis and impact summary.

Specific Objective 5 - The student will execute the procedure to record, report, document, and distribute a software change.

Condition - The student will be given a copy of 609-CD-003-003 *Version 2.0 Operations Tools Manual*, a copy of 611-CD-004-004 *Mission Operation Procedures for the ECS Project*, a requirement for a software change, a software change file, and access to ClearCase™.

Standard - The student will use ClearCase™ correctly to process the change, print a report documenting the change, identify without error the proper distribution for the change, and successfully accomplish the software transfer and installation.

Specific Objective 6 - The student will execute the procedure to record, report, document, and distribute a hardware change.

Condition - The student will be given a copy of 609-CD-003-003 *Version 2.0 Operations Tools Manual*, a copy of 611-CD-004-004 *Mission Operation Procedures for the ECS Project*, a requirement for a hardware change, data on the hardware change, and access to the Change Request Manager and the Baseline Manager and Inventory/Logistical Management software.

Standard - The student will use the software correctly to process the change, print a report documenting the change, and identify without error the proper distribution for the change.

Specific Objective 7 - The student will execute the procedure to record, report, document, and distribute a change to the baseline.

Condition - The student will be given a copy of 609-CD-003-003 *Version 2.0 Operations Tools Manual*, a copy of 611-CD-004-004 *Mission Operation Procedures for the ECS Project*, a requirement for a baseline change, a written description of the baseline change, and access to the Baseline Manager and Inventory/Logistical Management software.

Standard - The student will use the Baseline Manager and Inventory/Logistical Management software correctly to enter data documenting the change and print a report documenting the change. The student will identify without error the proper distribution for the change.

Importance

This lesson provides students who will be CM Administrators at the DAACs , SMC, and SEO with the knowledge and skills needed for effective ECS configuration management. It also provides students who will be System Engineers, System Test Engineers, and Maintenance Engineers at the DAACs with background knowledge and skills for their roles in CM, including implementation and documentation of system-wide changes directed by the Earth Science Data and Information System (ESDIS) CCB and changes directed by a local CCB and/or the Sustaining Engineering Organization (SEO). It ensures management of the capability to:

- control operations across ECS functional segments and operational sites.
- manage successful implementation of large numbers of anticipated system changes.
- interface effectively with interfacing organizations and Change Control Boards (CCBs).
- communicate changes and baseline definitions to all affected organizations.

It familiarizes students with:

- the importance of early customer involvement in changes.
- the CM tools to be used in all elements of the ECS Project during operations.
- the organization and interactions among hierarchical CCBs.
- the proper use and deployment of CM database assets to support all CCBs.
- the necessary coordination among all elements involved in accomplishing a change in ECS.

It facilitates the achievement of a streamlined CM approach that ensures local organizations operate effectively with the needed autonomy to accomplish their missions, minimizing outside intervention to promote timely resolution of local problems and to enable change during continued timely production of data products.

625-CD-012-002

This page intentionally left blank.

M&O Role in ECS CM Activities•

The Maintenance and Operations (M&O) CM activities begin when ECS products are accepted by ESDIS at the host operational sites (i.e., pass Release Readiness Review (RRR) or an otherwise formal transition to operations). In the CM concept:

- ECS operations baselines are established at RRR.
- baselines include:
  - COTS hardware and software.
  - custom software.
  - science software.
  - data base schema.
  - related ECS documentation.

Controlling the maintenance and operations changes to ECS products as deployed at the host sites is an ECS Maintenance and Operations (M&O) CM requirement. M&O's specific CM objective is to control the host site's baseline for component changes that may result from:

- system updates.
- introduction of non-ECS components.
- maintenance actions.
- operations actions.

Operational sites each have a change control function, which is referred to as the site Configuration Control Board (CCB) activity. These sites include:

- Distributed Active Archive Centers (DAACs).
- the EOS Operations Center (EOC).
- the ESDIS System Monitoring and Coordination Center (SMC).

M&O is not a decision-making authority, but assists in implementing site-level and project-wide decisions. The M&O organization provides administrative and technical support to site CCBs to coordinate use of approved CM procedures and to ensure that changes to site hardware, software, and procedures are properly documented and coordinated. Specific responsibilities include:

- Configuration identification: maintenance and control of technical documentation.
- Configuration status accounting: recording and reporting information about the configuration status of ECS documentation, hardware, and software throughout the project life cycle; XRP-II is a software tool used in this baseline management.
- Configuration audits: M&O supports internal and ESDIS assessments of project compliance with relevant CM plans, to ensure that CM policies, procedures, and practices are followed, that approved changes are properly implemented, and that the as-deployed configuration of ECS matches the as-built documentation of configuration items, or that adequate records of differences are available at all times.

625-CD-012-002

System-level Change Control

The ECS M&O organization provides administrative and technical support services for the CCB at each site. Change control at the system level is coordinated through an ESDIS-chartered Project Control Management Board, supported by the Sustaining Engineering Organization (SEO) and site CCBs. Figure 1 illustrates the work flow for the SEO CM Administrator. Major activities or responsibilities are identified by numbers in the figure and addressed with corresponding numbers in the following discussion.

- Configuration Change Requests (CCRs) are received by the SEO CM Administrator from all sources. Those changes which are designated as from "other sources" (1) may be system enhancements, changes in procedures, changes in external or internal interfaces, or changes in documentation. These changes are not the subject of contemporaneous problem reports first deliberated by the Trouble Ticket Review Board (TTRB) and/or Failure Review Board (FRB).
- Proposed common baseline changes (2) are proposed based on Trouble Ticket (TT) resolutions obtained from the respective review boards. A TT is closed by a corresponding CCR, which may do one of two things:
  - Ratify, or make permanent, a prior temporary/emergency action taken by the TTRB.
  - Consider a normal priority (scheduled) change for incorporation into future change releases.
- The SEO CM Administrator logs the CCR into the Change Request Manager (3). The Change Request Manager is the DDTS tool.
- The CCB chair assigns an evaluator and the SEO CM Administrator coordinates an assessment of the impact of the proposed CCR (4).
- Class I change requests (proposed changes that affect controlled milestones, schedules, budget, cost, and requirements) are forwarded to the ESDIS CCB (5) for consideration with recommendations from the Project Control Management Board.
- Class II change requests (proposed changes that affect documentation, alternative use of hardware, correction of software errors, and COTS product substitution without a Class I impact) are considered by Project Control Management Board deliberations (6).
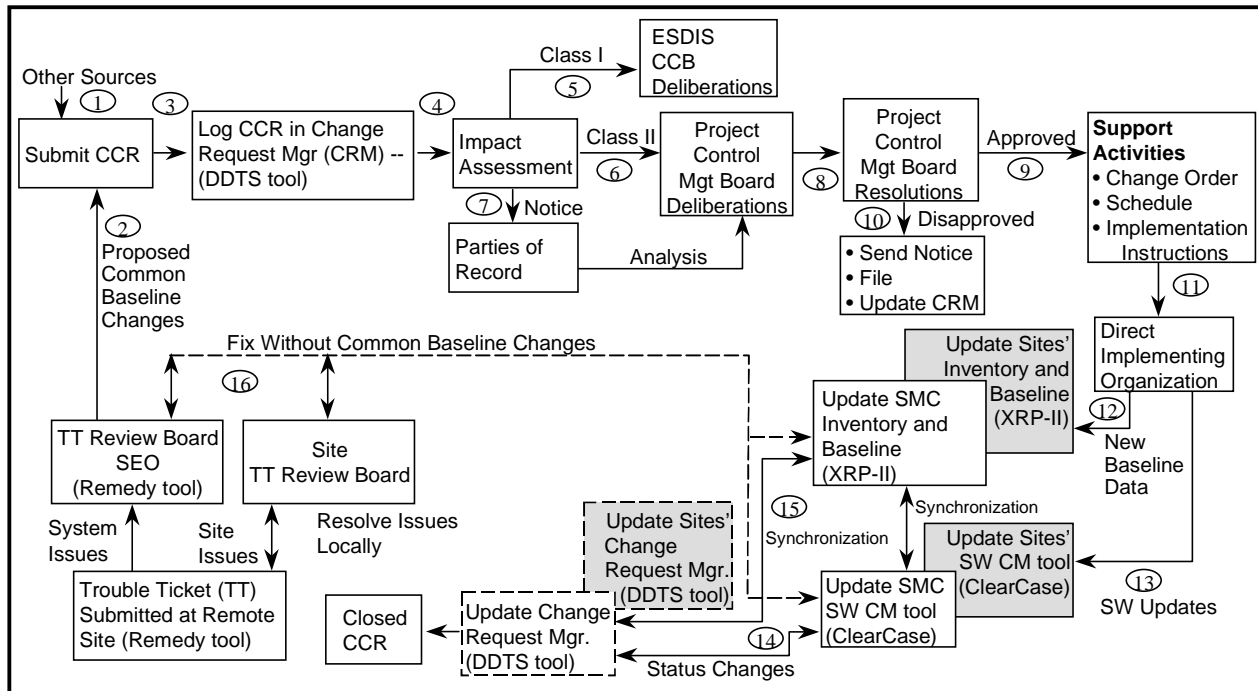
625-CD-012-002

Figure 1. System-level Change Control and SEO CM Administrator Work Flow

- Notice of proposed changes (7) is distributed to affected parties and review board members to obtain and coordinate impact assessment and optimize the approach to implement proposed changes. These parties review the proposed changes, ensure that all known impacts are identified and defined, help identify factors that will need to be addressed for successful implementation, and identify ways in which implementation can be facilitated.

- The results of Project Control Management Board deliberations are factored into review board resolutions (8) which determine whether, when, or where the system changes will be implemented.

- Approved changes (9) are processed by the SEO CM Administrator with change orders, schedules, and implementation instructions to the support activities, i.e., site CCBs, support personnel (SEO), vendors, or others who may be involved in implementing the change.

- Disapproved change requests (10) are processed by the SEO CM Administrator with official notifications, memo to the file, and update of the Change Request Manager (CRM).

- The SEO CM Administrator tracks implementation and closure of CCRs by directions to implementing organizations and their acknowledgments (11) using the CRM tracking and status monitoring features.

- New versions and/or maintenance updates are annotated (12) in the Baseline Manager and any associated inventory changes are entered in the Inventory/Logistical Management tool at SMC and at affected sites using procedures for configuration identification, activation dates, deactivation dates, and issuing version description documents.

625-CD-012-002

- Concurrently with the Baseline Manager and Inventory/Logistical Management tool updates, the SW Configuration Management tool (ClearCase™) is updated (13) with directory trees, installation files, and software as required by SW maintenance.

- Status of the activity to implement changes and assigned responsibilities is tracked (14) through closure in the CRM at SMC and at the sites.

- The databases are synchronized (15) by manual checking between applications (Baseline Manager vs. CRM vs. SW CM tool) and automated verification by the SW CM tool for purposes of SW distribution and maintenance.

- The TT Review Board is empowered to make emergency fixes without common baseline changes (16) and to update these changes directly to the Baseline Manager with documentation to follow in the form of the CCR submitted to the appropriate CCB. Proposed common baseline changes must be submitted by CCR to the Project Control Management Board.

Site-Level Change Control

Change control at the site level is depicted in Figure 2, which illustrates the work flow for the site-level CM Administrator. Major activities or responsibilities are identified by numbers in the figure and addressed with corresponding numbers in the following discussion.

Figure 2. Local Change Control and Site-level CM Administrator Work Flow

- Configuration Change Requests (CCRs) are received by the Site CM Administrator from all sources with regard to the **site unique extensions** to the operational ECS. Those changes which are designated as from "other sources" (1) may be system enhancements, changes in procedures, changes in external or internal interfaces, or changes in documentation. These changes are not the subject of contemporaneous problem reports first deliberated by the Site/SEO Trouble Ticket Review Board (TTRB) and/or Failure Review Board (FRB).
- Proposed site baseline changes (2) are proposed based on Trouble Ticket (TT) resolutions obtained from the respective review boards. A TT is closed by a corresponding CCR, which may do one of two things:
  - Ratify, or make permanent, a prior temporary/emergency action taken by the TTRB.
  - Consider a normal priority (scheduled) change for incorporation into future change releases.
- The Site CM Administrator logs the CCR into the Change Request Manager (3). The Change Request Manager is the DDTS tool.
- The CCB chair assigns an evaluator and the Site CM Administrator coordinates an assessment of the impact of the proposed CCR (4).
- Class I/System Issues change requests (proposed changes that affect controlled milestones, schedules, budget, cost, and requirements) are forwarded to the Project Control Management Board (5) for consideration with recommendations from the Site CCB. Class I issues are further forwarded with recommendations by the Project Control Management Board to the ESDIS CCB for consideration.
- Class II change requests (proposed changes that affect documentation, alternative use of hardware, correction of software errors, and COTS product substitution without a Class I impact) are considered by Site CCB deliberations (6).
- Notice of proposed changes (7) is distributed to affected parties and review board members to obtain and coordinate impact assessment and optimize the approach to implement proposed changes.
- The results of Site CCB deliberations are factored into CCB resolutions (8) which determine whether, when, or where the system changes will be implemented.
- Approved changes (9) are processed by the Site CM Administrator with change orders, schedules, and implementation instructions to the support activities, i.e., other CCBs, support personnel (SEO), vendors, or others who may be involved in implementing the change.
- Disapproved change requests (10) are processed by the Site CM Administrator with official notifications, memo to the file, and update of the Change Request Manager (CRM).
- The Site CM Administrator tracks implementation and closure of CCRs by directions to implementing organizations and their acknowledgments (11) using the CRM tracking and status monitoring features.
- New versions and/or maintenance updates are annotated (12) in the Baseline Manager and any associated inventory changes are entered in the Inventory/Logistical Management tool at the affected sites and the SMC by following the procedures for

625-CD-012-002

configuration identification, activation dates, deactivation dates, and issuing version description documents.

- Concurrently with the Baseline Manager and Inventory/Logistical Management tool updates, the SW Configuration Management tool (ClearCase™) is updated (13) with directory trees, installation files, and software as required by SW maintenance.
- Status of the activity to implement changes and assigned responsibilities is tracked (14) through closure in the CRM at the sites.
- The databases are synchronized (15) by manual checking between applications (Baseline Manager vs. CRM vs. SW CM tool) and automated verification by the SW CM tool for purposes of SW distribution and maintenance.
- The on-site TT Review Board is empowered to make emergency fixes without common baseline changes (16) and to update these changes directly to the Baseline Manager with documentation to follow in the form of the CCR submitted to the appropriate CCB. Proposed common baseline changes must be submitted by CCR to the Project Control Management Board.

Each site's CCB accepts initial release or updates from the ESDIS CCB. Similarly, the DAAC CCBs accept product generation software from an ESDIS authority. Local tailoring and installation decisions are determined by the site CCB.

Science Software CM

Each site maintains control over its site operational environment and products developed and/or delivered outside of the ECS project. Science software is one such outside product:

- facilitates the ECS production of Standard Products.

- developed by science investigators at the Science Computing Facilities (SCFs).

- once delivered to the DAAC, it enters the custody of the local DAAC CM organization.

- supported as needed by ECS local personnel.

- Integration and Testing (I&T) conducted by DAAC management in coordination with the local ECS Project's Science Software I&T team.

- after acceptance, revised science software package and all test data are transferred to the control of the local DAAC Manager.

- changes to science software having inter-DAAC dependencies requires coordination with the affected DAACs.

- local DAAC CM organizations ensure that coordination and agreement among ESDIS and affected DAACs is completed before changed science software is moved into production.

Sustaining Engineering Organization (SEO)

The SEO provides a service-oriented organization, standard tools, and processes supplied as CM procedures that can be universally applied to implement ECS on-site CM functions at all operational activities. The SEO performs a range of project-wide CM activities:

- liaison between the ECS Project on-site activities and the ESDIS CCB.

- coordination of CM functions to ensure that CM procedures are carried out in accordance with the ESDIS CM Plan.

- administrative support to the ESDIS CCB.

- coordination with ECS on-site CCBs.

- maintenance of the Change Request Management System.

- maintenance of a software tool to manage the M&O software libraries for the ECS Project.

- support for ECS Project Reviews and audits.

- oversight for dissemination of controlled items to operational sites.

- monitoring installed configurations of developed software and COTS hardware and software for conformance to approved baselines.

The SEO reviews proposed changes to system-wide ECS operations baselines, assesses impacts of the proposed changes, and provides recommendations to the ESDIS CCB on them.

625-CD-012-002

Maintenance of the M&O Libraries

ECS products deployed to the operational sites include software which is common to various operational sites, a golden copy of which is centrally maintained, and software which is site-specific. Both common and site-specific software that has been released for operational use is maintained in the M&O SW Library at each site (On-Site SW Library). As shown in Figure 3, the software is under the control of a Software Change Manager (ClearCase[TM]).

- maintained centrally at the SMC (golden copy).

- maintained by site personnel (on-site library).

- supported and controlled by the software tool, Software Change Manager.

  - manages the sharing and control of source, object, and executable files.

  - tracks the software build process so that maintainers can determine what was built and how it was built; can also instantly recreate the source base from which a software system was built, allowing it to be rebuilt, debugged, and updated without interfering with other programming work.

  - automates the enforcement by project administrators of operational policies and procedures.

  - tracks documentation as well as source elements; supports the creation of new element types and the assigning of user-defined attributes to these types; provides for recording of configuration items, with attributes, and a chronological change history for each configuration item.
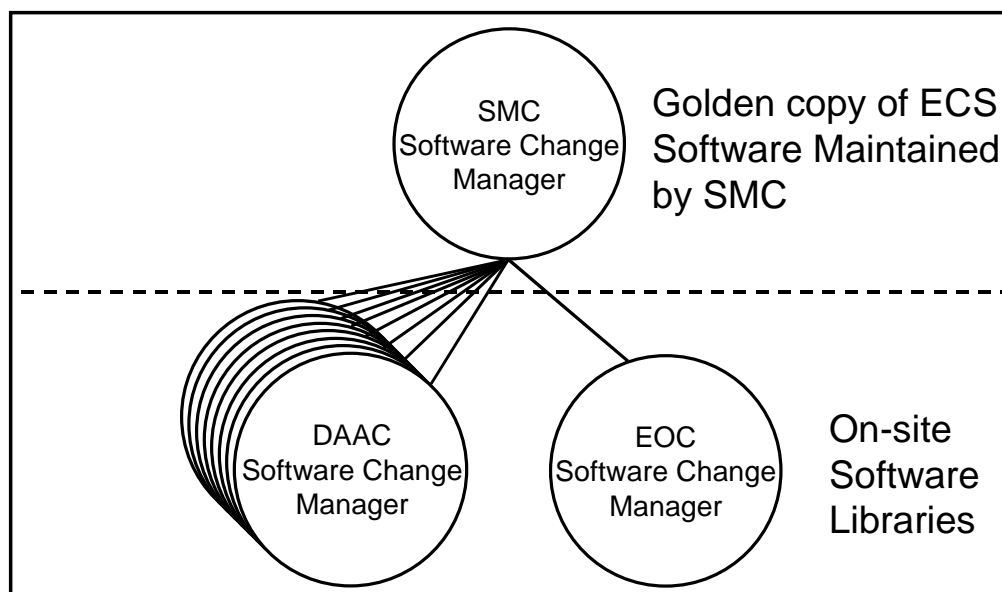

Figure 3. Software Change Manager at Central and On-site Software Libraries

625-CD-012-002

Library Administration

Software documentation and other documentation may be available in hard copy or soft copy. COTS documentation is to be physically located in the library in its own section. Documentation available on CD ROM is to be located in a separate cabinet. Documentation available on line is to be posted in the library and on the Document Management Server.

Document management functions are served by two directories that exist only on the Document Management Server host machines:

- $ECS_HOME/OPS/CUSTOM/docins: serves to retain descriptive or other material.
- $ECS_HOME/OPS/CUSTOM/docserver: serves to retain the documents themselves.

At SEO, documentation and software residing in the library are controlled and maintained through a library database designed in Microsoft Access. The database enables personnel to locate and retrieve document information. The database search functions provide adequate information to retrieve the most current version of a document. The database also permits COTS documentation requests to be submitted to the librarian.

Site personnel maintain partitioned libraries to facilitate access control of science software and other software not developed by ECS. Site personnel are responsible for any CM activities concerned with this library. Specifically, certain ECS documents are under CM control as part of the baseline (e.g., 609-CD-003-003, *Version 2.0 Operations Tools Manual*). The Baseline Manager Tool is used to record the change history and updates to those documents, as well as to provide the master index for the library. Use of the Baseline Manager Tool is addressed in a different context under a later topic in this lesson.

Baseline Control during Maintenance and Operations

ECS is characterized by a phased implementation and delivery using multiple releases. From an M&O CM perspective, each release has the following major milestones:

- acceptance of each host site's Installation Plan (IP); documents the COTS hardware, the hardware's configuration, and the installation schedule for each site.

- a Consent to Ship Review (CSR); documents the state of the configuration items including the development configuration at the ECS Development Facility (EDF), the actual configuration of each host site's hardware, and the planned configuration of each host site's software.

- a Release Readiness Review (RRR); documents the state of the configuration items including the actual configurations at each of the host sites.

- an Operational Readiness Review (ORR); documents the flight-certified and ESDIS-approved fully integrated EOS Ground System (EGS).

625-CD-012-002

Prior to RRR, the development CM controls the baseline. Development organizations follow the practices and procedures of the host site configuration control process for installation of hardware into the facility and use of hardware (including operational test strings).

At RRR M&O CM impounds the configuration including:

- COTS hardware.

- COTS software and control files.

- Custom software source code.

- Custom software binaries.

- Custom software database schema and/or contents.

- Build and installation procedures, job control decks, test, training and operational material, and related documentation; subsequent configuration changes are controlled by the appropriate engineering or operations organization at each site.

Site Authority

At RRR, the ECS On-Site Organization interfaces with the local site CCB and provides engineering recommendations for requested changes to common software. Change control authority depends on the type of change in question:

- ESDIS - authority over changes to common software for system-wide implementation.

- site CCB - authority over site-specific Class II changes (those not requiring contractual change for implementation).

    - site-specific parameters for COTS software installed at operational sites.

    - specific configuration of tools and utilities installed at local site, as delegated by ESDIS.

625-CD-012-002

Configuration Identification

Configuration identification establishes unique identifiers for ECS control items to allow for the establishment and maintenance of control and status accounting for the items:

- Hardware.
- Software.
- Databases.
- Documentation.

Configuration identification originates from the ECS Development Configuration Items List (CIL). Therefore, it is necessary to be familiar with developer guidelines for configuration identification and the Configured Article List (CAL). There are several useful references, including:

- ESDIS CM Plan (June 1996).
- MO&DSD CM Plan (September 1995).
- ECS M&O CM Plan (November 1995).
- Software Build Process, CM-1-023 (Project Instruction, 25 March 1996).
- Software Naming Conventions, SD-1-015 (Project Instruction, 14 July 1995).
- Directory and File Name Guidelines and Standards for Release A (15 April 1996).
- Document Numbering, DM-1_002 (Project Instruction, 25 November 1994).
- DoD MIL-STD-973 (April 1992).

A standard format for ECS extended configuration identification is:

Control Item.Release.Organization.#_Dev.#_M&O.#_Center

where:

- **Control Item** is the ECS Project designation for the Configuration Item at Release Readiness Review (RRR) turnover.
- **Release** is the major release.
- **Organization** is the organization that established the configuration. Valid values are **DEV** (for development), **SEO**, or a specific center acronym (e.g., **SMC, EOC, EDC, GSFC, LaRC**).
- **#_Dev** is a numeric identifier applied by the development organization to the major release and/or a minor release.
- **#_M&O** is a numeric identifier applied by the M&O/SEO organization. This field is used by the SEO to establish the system M&O baseline.
- **#_Center** is a numeric identifier applied by each center. This field is used by the operational centers to establish the site-specific baseline.
- For example, as suggested by Figure 4, a software item at EROS Data Center (EDC) that represents an EDC-specific baseline for a configuration item originally delivered as CI.B.DEV.3, subsequently established by M&O as CI.B.M&O.3.0, further tailored and released to the operational centers as CI.B.SEO.3.1, might be baselined as CI.B.EDC.3.1.1.
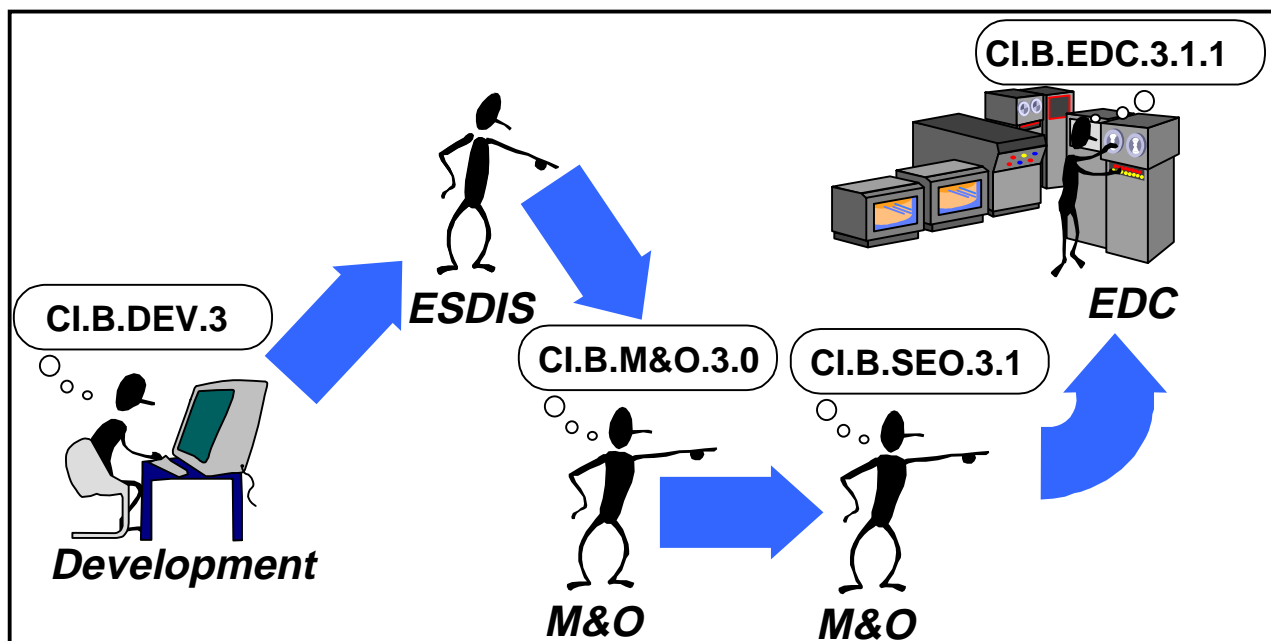
Figure 4. Use of Standard Format for ECS Extended Configuration Identification

For configuration identification, use the following procedure.

Configuration Identification

1   Assign identifiers to configuration items (CIs) and their component parts and associated configuration documentation, including revision and version number where appropriate.
  - Assign serial and lot numbers, as necessary, to establish the CI effective status of each configuration of each item of database, documentation, hardware, and software.
  - Follow ECS developer guidelines for custom-developed items.
  - Follow vendor nomenclature for COTS items.

2   Apply maintenance and operations (M&O) version name extensions to ECS modified item nomenclature following the standard format for ECS extended configuration identification.

3   Follow author-designated version control and nomenclature for documents and follow guidelines from the ECS SEO Librarian.

4   Support the ECS SEO Librarian's efforts to maintain linkage of the ECS documentation to ECS CIs in the Baseline Manager tool.
  - Ensure that the marking and labeling of items and documentation with their applicable identifiers enables correlation between the item, configuration documentation, and other associated data.

5   Maintain a release system for configuration changes.

6   Maintain views of operational baselines using the Baseline Manager tool.

7   Ensure that applicable identifiers are embedded in the source and object code.

625-CD-012-002

For configuration control, use the following procedure.

Configuration Control

1	The Change Control Boards (CCBs) chartered by the ESDIS CCB shall apply configuration control measures to all the ECS CIs and the associated documentation prior to the time they are baselined for operations.
2	Provide a formal and effective means for proposing engineering changes to CIs.
3	Provide a formal and effective means for requesting deviations and waivers.
4	Provide formal notices of revisions.
5	Provide Specification Change Notices and Document Change Notices.
6	Ensure the implementation of approved changes.

For configuration status accounting, use the following procedure.

Configuration Status Accounting

1   Issue a Change Request Manager report on new CCRs and revisions monthly.
- Provide an annual summary of CCRs and revisions.

2   Ensure CCB review of all CCRs.
- Distribute CCR copies (and Impact Analysis forms if applicable) for review prior to the CCB meeting.
- Print and distribute a formal agenda prior to the CCB meeting.

3   Status open action items regularly between CCB meetings.

4   Conduct CCB meetings and formally record the CCB's disposition of each CCR.
- Record actions, assignments, and due dates.
- Distribute minutes to the standard distribution and inform those assigned responsibility of assigned action items.

5   Maintain document changes through the SEO Librarian.
- When all authorized document changes have been accomplished, prepare a Document Change Notice (DCN).
- Post the final version.
- Distribute hard copy as required.

6   Monitor CCR Implementation Status.
- After CCB disposition, regularly status open CCRs until closure.
- Class I events include: CCR to Project Control Management Board for review approval; Technical Review Board; and ESDIS Disposition.
- For M&O implementation, further events include: Consent Obtained; Item Received; Installed; Document Completed.
- A Class I CCR is not closed until the ESDIS contract officer's authorization is received or the reference CCR has been withdrawn.
- Class II document change CCRs may be closed with the CM Administrator's issuance of the DCN.

- Other non-document change CCRs may be closed when the originator verifies to the CM Administrator that all specified changes have been implemented.

For configuration audits, use the following procedure.

Configuration Audits

1 Review the set of issues addressed in the process for which the audit is to be taken.
- Audits are standardized within the set of issues addressed.
  - Functional Configuration Audit/Physical Configuration Audit (FCA/PCA).
  - Security Issues.
  - General Accounting.
  - Test Readiness Review.
  - Operational Certification.

2 Prepare an audit plan specifying the detailed assessments to be conducted.
- Identify the tests, inspections, reviews, or other verifications required.

3 Prepare an agenda for any conferences to be held.
- Identify the planned location, date, attendees, time schedule, and topics addressed.

4 Schedule resources necessary to conduct meetings and to collect and analyze the data.
- Ensure availability of all necessary technical documentation (e.g., applicable specifications, drawings, manuals, schedules, design data, test data)..
- Ensure availability of all tools and inspection equipment necessary for evaluation and verification.
- Ensure unencumbered access to the areas and facilities of incoming inspection, fabrication, production, and testing.
- Ensure any necessary isolation of the item(s) and detailed parts to be reviewed.

5 Collect data.
- Conduct the planned tests, inspections, reviews, or other verifications.

6 Analyze data to produce interpretable test results.
- Conduct any necessary statistical tabulations, summaries, and analyses.

7 Prepare meeting minutes, including resulting audit action items.
- Attach relevant documentation (e.g., copies of inspection reports, process sheets, data sheets, and other documentation deemed necessary by Government FCA/PCA teams.

Configuration Control Boards (CCBs)

There are multiple levels of configuration management within the ECS Project. The project Configuration Control Board (CCB) procedures exist in the context of procedures reflected in the *Mission to Planet Earth (MTPE)/Earth Observing System (EOS) Configuration Management Plan*, 420-02-02. That plan identifies the organization, authority, and responsibilities of CCBs for NASA Headquarters, the MTPE Office, Projects within the MTPE/EOS organization at GSFC, and contractors and Principal Investigators. Contractor CCB procedures, including those for ECS, are subject to the approval of their respective MTPE/EOS Project Office. For the ECS program, that office is the Earth Science Data and Information System (ESDIS).

Figure 5 illustrates four levels of a CCB hierarchy for the ECS program relative to that office.
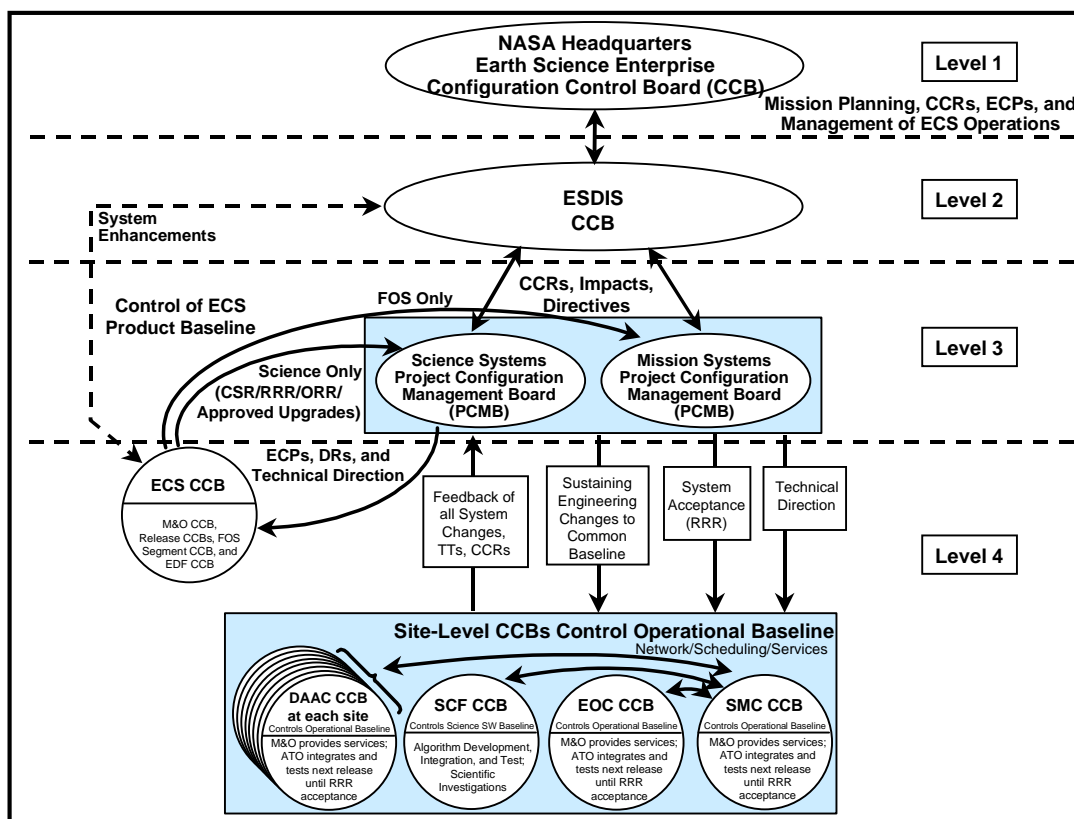

Figure 5. Hierarchy of Configuration Control Boards

- NASA management layers.
    - Two NASA management layers at Headquarters (level 1) and Goddard Space Flight Center's Earth Science Data and Information System (ESDIS)(level 2) control the overall ECS mission and contract, respectively. The level 2 Change

Control Board (CCB) controls the ECS implementation, maintenance, and operations at the various field sites.
- At level 2, ESDIS establishes ECS CM policies and, through contract, controls ECS implementation, maintenance, and operations at the various field sites. There are also four project CCBs (AM Project, PM Project, Chemistry and Special Flights Project, and Landsat 7 Project), as well as the Earth Science Enterprise Management Control Board (MCB), which reviews Class I project change requests prior to their submission to the NASA HQ PCB.

- Project Control Management Board (level 3): The Missions System Board (PCMB) manages and controls the requirements for the ECS Flight Operation Segment (FOS), EOS Polar Ground Stations, EDOS, NISN, and ETS. The Science Systems Board (PCMB) oversees the Science and Communications Development Office at the ECS contractor, the SMC, and the individual DAAC boards.
- ECS Project CCB (level 4): At this level, the performing organization (ECS Development) controls ECS development activities through the RRR.
- On-site CCBs (level 4): control the operational ECS; each DAAC board and the SMC are responsible for maintaining the site physical baseline.
    - run by host organizations.
    - supported by ECS M&O.

Specific CM responsibilities

Specific CM responsibilities pertain to each level:

- ESDIS Management -- establishes ECS CM policies.
- CCBs -- classify, prioritize, evaluate, recommend, and approve (within their authority) changes to the ECS operations baselines.
- CM administrators (at SMC, EOC, DAACs, and SCFs) --
    - establish and maintain CM records, including hardware lists, drawings, and documents.
    - facilitate the configuration change request (CCR) process.
    - monitor and report status of proposed and approved CM actions.
    - support their respective CCB (as required).
- Sustaining Engineering Organization (SEO) --
    - assesses feasibility and cost, schedule and performance impacts of proposed system-wide changes.
    - implements such changes when directed by ESDIS.
- DAAC System Engineers/System Test Engineers --
    - assess DAAC impacts of system-wide proposed changes.
    - develop and maintain ESDIS-approved DAAC-specific modifications to ECS products.
- Maintenance Coordinators --
    - maintain ECS HW and report configuration changes resulting from maintenance actions.

625-CD-012-002

Relationships among CCBs

Figure 6 illustrates some of the relationships and activities in which CCBs are involved.
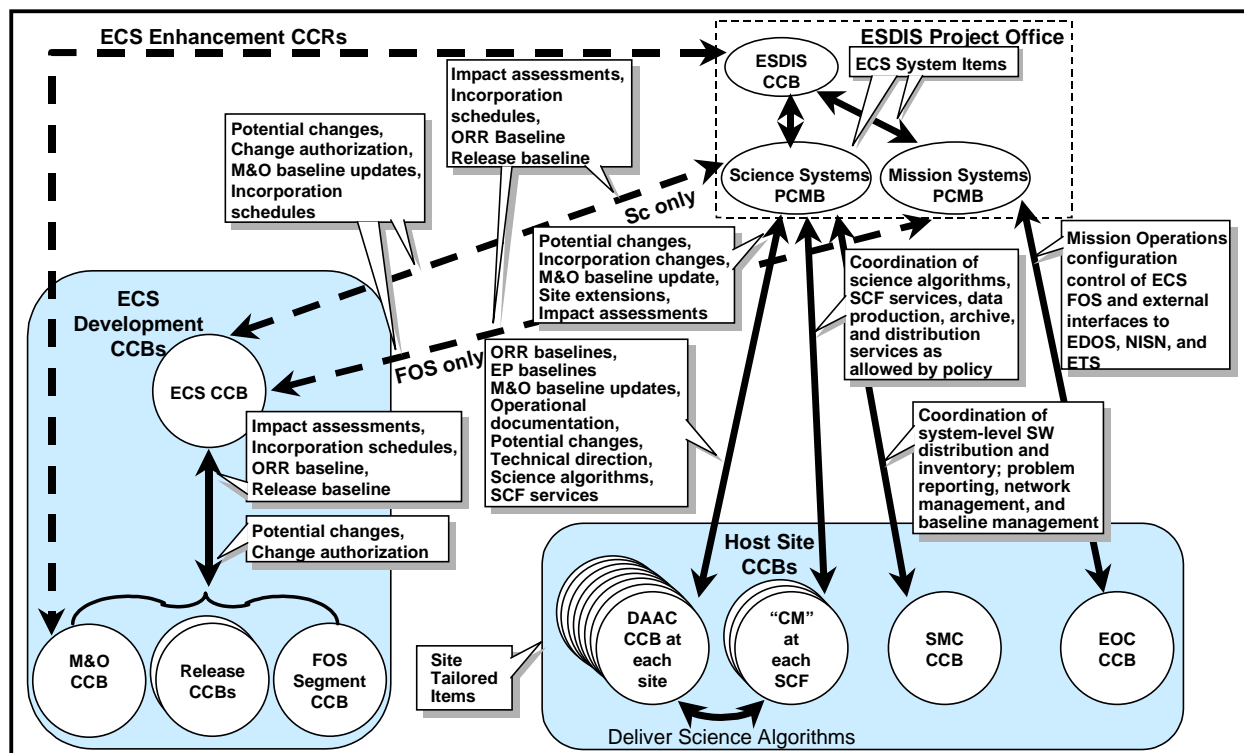

Figure 6. Operational CCB Relationships

There are several areas of coordination and control involved in ECS configuration management:

- CCBs at operations centers and the ECS CCB interact directly with the ESDIS CCB.
- ECS sub-tier development CCBs manage installation and changes at each location prior to RRR under the governance of the ECS CCB and, as necessary, the ESDIS and host center CCBs.
- the ECS M&O organization at each center does not constitute a CCB but, rather, supports the host organization's CCB.
- the ESDIS CCB provides configuration control over all ECS developed CIs, in accordance with the ESDIS Distributed Active Archive Center (DAAC) Strategic/ Management Plan.

Science Software and Change Control

Each Science Computing Facility (SCF) performs its own configuration control, without an active support role by the ECS contractor. Specifically, the SCF provides two types of configuration control:

- Configuration control of software and databases that are to be executed in another site's environment.
- Configuration control of SCF resources that are made available to the EOSDIS community.

The ECS M&O CM function at each DAAC accepts science software and data items from the SCF. These items are incorporated into the DAAC's operational baseline as directed by the DAAC CCB.

The EOC controls the operational configuration of the required EOC operational baseline. The ECS M&O CM function provides services as directed.

The Project Control Management Board is charged with the responsibility for centralized coordination and control of ECS CM activities to ensure:

- ECS integrity and quality of service.
- Successful coordination with internal and external networks, systems, and on-site facilities.
- Timely ESDIS CCB visibility into and oversight of ECS operations.
- Convenient user administrative services.

Configuration Change Requests (CCRs)

All requests for change must be documented using a Configuration Change Request (CCR) form.

- Generated against the data base, document/drawing, or hardware/software product baseline affected by the proposed change.
- Persons other than the CM Administrator may complete the form electronically using word processing software.
- Numbered items on the form correspond exactly to the data entry required to be performed by the CM Administrator using the Change Request Manager tool.
- Submitted to the appropriate CCB.
- May be used as a cover sheet for deviations and waivers.

A sample of a CCR Form appears in Figure 7.

Figure 7. ECS CCR Form

625-CD-012-002

Change Request Manager

Figure 8 illustrates the main screen of the Change Request Manager tool, DDTS. It is used at the sites to prepare CCRs, and at the SMC to consolidate system-wide CCRs.

Figure 8. Change Request Manager (DDTS) Main Screen

Suppose experience with ECS has led to discussion and consensus among operators that the label for one of the dialog boxes in one of the custom ECS applications should be changed from "File Selection" to "Production Request Selection." As CM Administrator, you have received a paper copy or electronic mail with a CCR for the proposed change. Use the following procedure and the Change Request Manager to enter the necessary data, compose, and print the CCR.

CCR Preparation

1   On workstation *x0mss##*, at the UNIX prompt in a terminal window, type **/usr/ecs/*mode*/COTS/ddts/bin/xddts** at a UNIX command prompt and then press the **Return** key (where *mode* is likely to be **TS1**, **TS2**, or **OPS**).
   - NOTE: The *x* in the workstation name will be a letter designating your site: **g** = GSFC, **m** = SMC, **l** = LaRC, **e** = EDC, **n** = NSIDC, **o** = ORNL, **a** = ASF, **j** = JPL; the *##* will be an identifying two-digit number (e.g., **n0mss02** indicates a management services subsystem workstation at NSIDC). If you access the workstation through a secure shell remote login (ssh), you must enter **xhost <remote_workstation_name>** and enter **setenv DISPLAY <local_workstation IP address>:0.0** prior to the ssh before entering the command after the ssh.
   - A default warning dialog box is displayed.
2   Click on the **OK** button.
   - The **Pure DDTS** top portion of the **Change Request Manager main screen** is displayed.
3   To submit a new CCR, click on the **Submit** button.
   - The **Submit a New Defect** screen is displayed, with the **Submit to which class of projects** field defaulted to **Software**.
4   Type a question mark (i.e., **?**).
   - A selection box is displayed asking for choice of **One of . . . . ALL**, **Change_Request**, **calls**, **company**, **hardware**, **issue**, **request**, **software**, **software.CP**, **todo**.
5   Click on **Change_Request** to select (highlight) it and then click on the **OK** button.
   - On the **Submit a New Defect** screen, **Change_Request** is displayed in the **Submit to which class of projects** field.
   - The cursor moves to the **Project Name** field.
6   Type **ECS_CHNG_REQ** and then press the **Enter** key.
   - The **Record** screen is displayed, showing a system-generated unique **CCR number** and the **Date**, with the cursor at the **Revision** field..
7   The **Revision** field is optional. Because this is the first submission of this CCR, press the **Tab** key to bypass this field.
   - The cursor moves to the **Priority** field.
8   The default priority is **routine**, which is appropriate for this CCR. For higher priority CCRs, possible entries are **urgent**, and **emergency**. Press the **Tab** or **Enter** key.
   - The cursor moves to the **Change Class** field.

9 The default **Change Class** is **II**, which is appropriate for this CCR. The other option is **I**, for changes handled by ESDIS because of cost, schedule, or mission impacts that may require requirements changes. Press the **Tab** or **Enter** key.

- The cursor moves to the **Title** field. (The **Status** field is system generated.)

10 Type up to 72 characters for a descriptive title for the CCR (e.g., in this case, **Change Dialog Name to Production Request Selection**). Then press the **Tab** or **Enter** key.

- The cursor moves to the **Originator Name** field.

11 Type up to 25 characters (use the login name) to indicate the name of the person who is the author of the proposed change. Then press the **Tab** or **Enter** key.

- The cursor moves to the first **Organization** field.

12 Type up to 30 characters to indicate the name of the originator's organization (e.g., **NSIDC DAAC**). Then press the **Tab** or **Enter** key.

- The cursor moves to the first **Phone Number** field.

13 Type the telephone number where the originator can be reached. Then press the **Tab** or **Enter** key.

- The cursor moves to the **Organization Evaluation Engineer** field.

14 Type up to 25 characters (use the login name) to indicate the name of the person who initially determines whether or not the proposal has merit and should be entered into the DDTS database. Then press the **Tab** or **Enter** key.

- The cursor moves to the second **Organization** field. (The **CM Admin. Name** field is system generated.)

15 Type up to five characters to indicate the name of the CM Administrator's organization (NOTE: Valid values are **ASF**, **EDC**, **EOC**, **GSFC**, **JPL**, **LaRC**, **NSIDC**, **ORNL**, and **SMC**). Then press the **Tab** or **Enter** key.

- The cursor moves to the second **Phone Number** field.

16 Type the telephone number where the CM Administrator can be reached. Then press the **Tab** or **Enter** key.

- The **Proposed Change** enclosure screen is displayed.

17 The **Proposed Change** enclosure screen enables the operator to enter a free-text description of the perceived need or problem and a proposed solution. Use the arrow keys on the keyboard to move the cursor down two lines, and, under the **Need or Problem** heading, type a sentence or two stating that the current title on the dialog box is causing a problem. Then use the arrow keys to move the cursor down under the **Proposed Solution** label, and type a sentence stating the proposal to change the dialog box label to "Production Request Selection."

18 Follow menu path **File→Save Changes and Dismiss Editor** on the **Proposed Change** enclosure screen.

- The contents of the enclosure are saved and the **Change Request Manager main screen** is displayed, with the entered CCR data appearing in the **Record** section.

19 Click on the **Commit** button.

- The CCR Record is stored in the DDTS database and its name appears in the list of **'Change Request' Records** in the top portion of the **Change Request Manager main screen**.

20   Click on the **Print…** button on the **Change Request Manager main screen**..
- The **Printing Options** screen is displayed. This screen provides the operator with the capability to print a highlighted CCR or all of the CCRs in the index on the main screen, either in full-page, index, one-line, or three-line format.

21   Click on the **Print…** button on the **Printing Options** screen.
- The highlighted CCR is sent to the printer.

22   On the hard copy of the CCR, check off the designated CCB for changes processed by the ESDIS CCB and its ECS site-level chartered CCBs at the SMC, DAACs, and EOC. (NOTE: This information is not entered into the Change Request Manager.)
- Select target CCB from among ESDIS, ECS, SMC, EOC, or one of the DAACs (GSFC, LaRC, ASF, EDC, JPL, NSIDC, ORNL).

This page intentionally left blank.

Impact Analysis•

As an adjunct to the CCR process, support of the ESDIS CCB may require the assessment of the impact of a proposed CCR on local or system maintenance and operations. The impact assessment may be conducted by the SEO or site maintenance and operations engineers. However, assessing the impact of CCRs with significant system implications and/or potential system-wide application may require the assistance of the ECS development organization. There is a formal procedure for requesting impact analysis. It requires preparation of a form requesting CCR Impact Analysis. The form is illustrated in Figure 9.

CCR Impact Analysis

Responder Request Number: ____   **Evaluation Engineer:** _____
Responder:_____   Evaluation Engineer Point of Contact:
Responder Point of Contract: address:_____
       address:_____   _____
       _____   phone:_____
       phone:_____   e-mail:_____
       e-mail:_____   Requested Return Date:_____
CCB Schedule Date:_____
CCR Number:_____
CCR Log Date:_____
CCR Originator:_____
CCR Originator Point of Contract:
       address:_____
       _____
       phone:_____
       e-mail:_____

Rough Order of Magnitude (ROM) Impact Analysis

Basis of Estimate:

Technical Assumptions and Comments:

Cost Impact:
       None [ ]
       Small [ ] < $100,000
       Medium [ ] $100,000 < x < $500,000
       Large [ ] > $500,000

Schedule Impact:

Technical Assessment: (Your impact analysis should consider the implementation approach; interfaces affected; HW or SW changes required; documentation changes required -- change from/to pages; suggested alternatives, if any; and impact to security features. If your system is not impacted, please provide that information to the CM Administrator.)

Comments:
                                        Signed:_____
                                                     (Responder)
                                        Date:_____

Figure 9. CCR Impact Analysis Form

The CCR Impact Analysis Form may be completed electronically using word processing software. When a CCR is distributed to the parties of record (see step 7 under "System-level Change Control" and "Site-level Change Control, pages 10 -14 of this lesson guide), an accompanying Impact Analysis form requests from each Evaluator an assessment of the projected costs and technical impacts of the proposed change. For guidance in preparing impact analysis requests, use the following procedure.

Impact Analysis Request Procedure

---

1 Determine the sites from which to request impact assessments for the CCR under consideration.
- After the impact assessments are completed, these sites, designated impact evaluators, are entered into the Change Request Manager software (DDTS). The site(s) may be one or more of the following: **SEO**, **ESDIS**, **GSFC**, **LaRC**, **ASF**, **EDC**, **JPL**, **NSIDC**, **ORNL**, **SMC**, **EOC**, **EDF**.

2 Enter the **Responder Request Number** on the first CCR Impact Analysis form.
- The **Responder Request Number** can be an arbitrary sequence number from **1** - **12** which, in conjunction with the **CCR Number**, uniquely identifies the impact analysis request. The numbers **1** - **12** should be used because they correspond to numbers used to enter the impact evaluators into the Change Request Manager after the impact assessments are completed.

3 Enter the **CCB Schedule Date** on the CCR Impact Analysis form.

4 Enter on the CCR Impact Analysis form the **CCR Number** of the CCR to be evaluated.

5 Enter on the CCR Impact Analysis form the **CCR Log Date**.
- The **CCR Log Date** is the date the CCR was submitted.

6 Enter on the CCR Impact Analysis form the data identifying the CCR Originator.
- The data include the name of the **CCR Originator**, **address**, **phone**, and **e-mail**.

7 Enter on the CCR Impact Analysis form the data identifying the Evaluation Engineer.
- This refers to the Organization Evaluation Engineer listed as the Evaluation Engineer on the CCR. The data to be entered include the name of the **Evaluation Engineer**, **address**, **phone**, and **e-mail**.

8 Enter the **Requested Return Date** on the CCR Impact Analysis form.
- The **Requested Return Date** should be set for up to two weeks prior to the CCB Schedule Date, to allow preparation and entry of a summary of all Impact Assessments and to permit submission of the CCR with the CCR Impact Summary to the CCB one week prior to the schedule date for the CCB meeting.

9 Repeat steps 2 - 8 for each additional Impact Evaluator identified in Step 1.

CCR Impact Summary

When the Impact Assessment requests are received at the site(s) of the Impact Evaluators, a responder is assigned to conduct the assessment and prepare the response. The responder conducts the assessment and fills in the necessary data on the Impact Analysis form:

- Responder data.
- Rough Order of Magnitude (ROM) Impact Analysis.

- Technical Assessment.
- Responder signature and date.

The Impact Evaluator returns the CCR Impact Analysis form to the requesting Evaluation Engineer. The Evaluation Engineer uses the returned Impact Analysis data to prepare a CCR Impact Summary form. The form is illustrated in Figure 10.

CCR Impact Summary

Evaluation Engineer: _____
Evaluation Engineer Point of Contact:
     address:_____
     _____
     phone:_____
     e-mail:_____
CCR Board Date:_____

Resources Summarized:

Technical Summary:

ROM Summary (BOE, Cost, and Schedule):

Recommendation:

Signed:_____
               (Evaluator)
Date:_____

Figure 10. CCR Impact Summary Form

The Evaluation Engineer may complete the CCR Impact Summary form electronically using word processing software. The CM Administrator then uses the Change Request Manager software (DDTS) to enter the Impact Summary and attach it to the CCR. To attach a CCR Impact Summary using the Change Request Manager tool, use the following procedure (*Note*: To change the state of a CCR, you must have CM Administrator privileges).

625-CD-012-002

Preparing a CCR Impact Summary

1   With the Change Request Manager open and its **Record** screen (see Figure 8) showing the data for the CCR (which has been committed to the database), follow menu path **Change_State→Assign-Eval**.
- The **Record** screen displays associated data fields for assigning impact assessment and the cursor at the **Evaluation Engineer** field.

2   Enter the name of the **Evaluation Engineer**.
- Use the login name (up to 8 characters) of the engineer responsible for analzying the proposed system change.

3   Enter the name of the Evaluation Engineer's **Organization**.
- Enter up to 5 characters; must be one of the following: **SEO**, **ESDIS**, **GSFC**, **LaRC**, **ASF**, **EDC**, **JPL**, **NSIDC**, **ORNL**, **SMC**, **EOC**, **EDF**.

4   Other entries on the screen are optional; as desired, enter any of the optional data: Evaluation Engineer's **Email Address**, **Impact Evaluators**, **Sites Affected**, **Related CCR#**, **CI Affected**, **Documents Affected**, **Release Affected**, **Baselines Affected**.
- The **Impact Summary** enclosure screen is displayed.

5   Enter information as desired from the Evaluation Engineer's CCR Impact Summary.
- The **Impact Summary** enclosure screen allows entry of free-text information under headings of **Summarize the impact statements received from the organizations requested to provide impacts**, **Resources Summarized**, **Technical Summary**, **ROM Summary (BOE, Cost, and Schedule)**, and **Recommendation**.

6   Follow menu path **File→Save** to save the enclosure.
- The selected state, **Assigned-Eval**, is now shown as the current state (Status) of the CCR record.

Software Baselines and Changes

Software releases are deployed by the ECS CCB or SEO with approval of the ESDIS CCB:

- Version Description Document (VDD) provides summary documentation package.

- ECS Project CMO or SEO maintenance programmers assemble and package the delivery.

- delivery to SMC, or , with ESDIS permission, directly to the sites.

A number of situations may require a change in software baselines. For example:

- *a COTS software problem* – an operator or user reports (using a Trouble Ticket) a problem with a COTS software package, and the vendor provides a patch to resolve the problem.

- *a custom software problem* – an operator or user reports (using a Trouble Ticket) a problem with custom ECS software, and the resolution involves a software modification.

- *a science software upgrade* – the Science Computing Facility (SCF) develops and provides an upgrade to the science software and the Science Software Support Team recommends its implementation.

- *a COTS software upgrade* – one of the COTS software packages is upgraded by its commercial developer, and the upgrade is shipped by the vendor to the ECS Property Administrator, in accordance with the vendor's contract.

- *a system enhancement* – a science user or one of the DAAC operators proposes an enhancement to one of the ECS custom software configuration items, and, when approved by the ESDIS CCB, the enhancement is developed by the SEO or by the ECS development organization.

625-CD-012-002

Software Transfer and Installation

For any of the scenarios, a software maintenance package that has been prepared by the SEO is transferred from the SMC to a remote site (a DAAC), and later the package is installed on a selected host computer under a CM-controlled process. Figure 11 illustrates the functional flow for the transfer.

- Change originates at the SEO, beginning when the SMC CM Administrator receives the software maintenance change.
- SMC CM Administrator provides ECS system-wide CM and exercises control and/or monitoring over the configurations.
- SMC CM Administrator directs transfer to a designated DAAC drop-off point, the SEO on-site software library.
- SEO CM Administrator ensures that changes are properly documented and coordinated, and maintains control of all configured hardware and software.
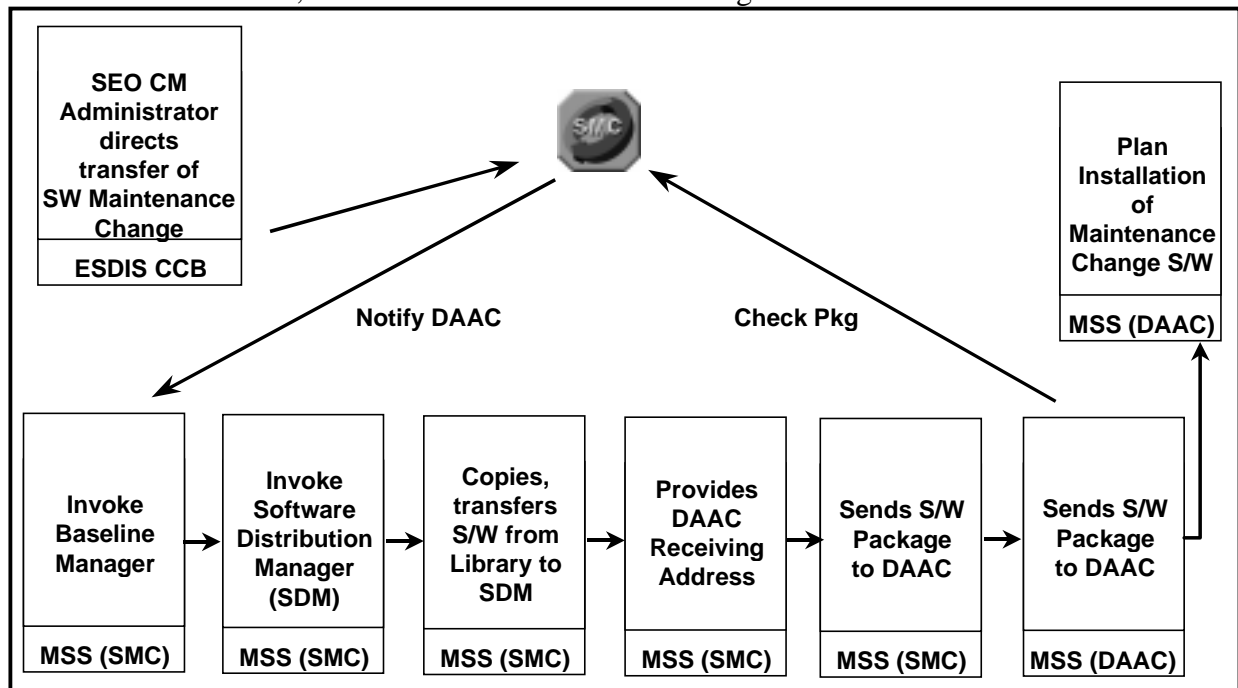

Figure 11. Software Transfer Functional Flow

Figure 12 illustrates the functional flow for installation.

- At the DAAC, the installation actions are executed by the DAAC Software Maintenance Engineer.
- The installation is under direction from the DAAC CCB.
- The DAAC CM Administrator ensures that changes are properly documented and coordinated, maintains control of all configured hardware and software, and assists in the development and administration of the library with respect to CM procedures.
- The DAAC Software Maintenance Engineer produces, delivers, and documents corrections, modifications, and enhancements made to ECS software (including COTS products), and/or adapts or incorporates COTS software for ECS use.
- The DAAC System Test Engineer develops and executes tests of received software changes with the support of DAAC operators, and submits requests to the DAAC Resource Planner for installation scheduling.
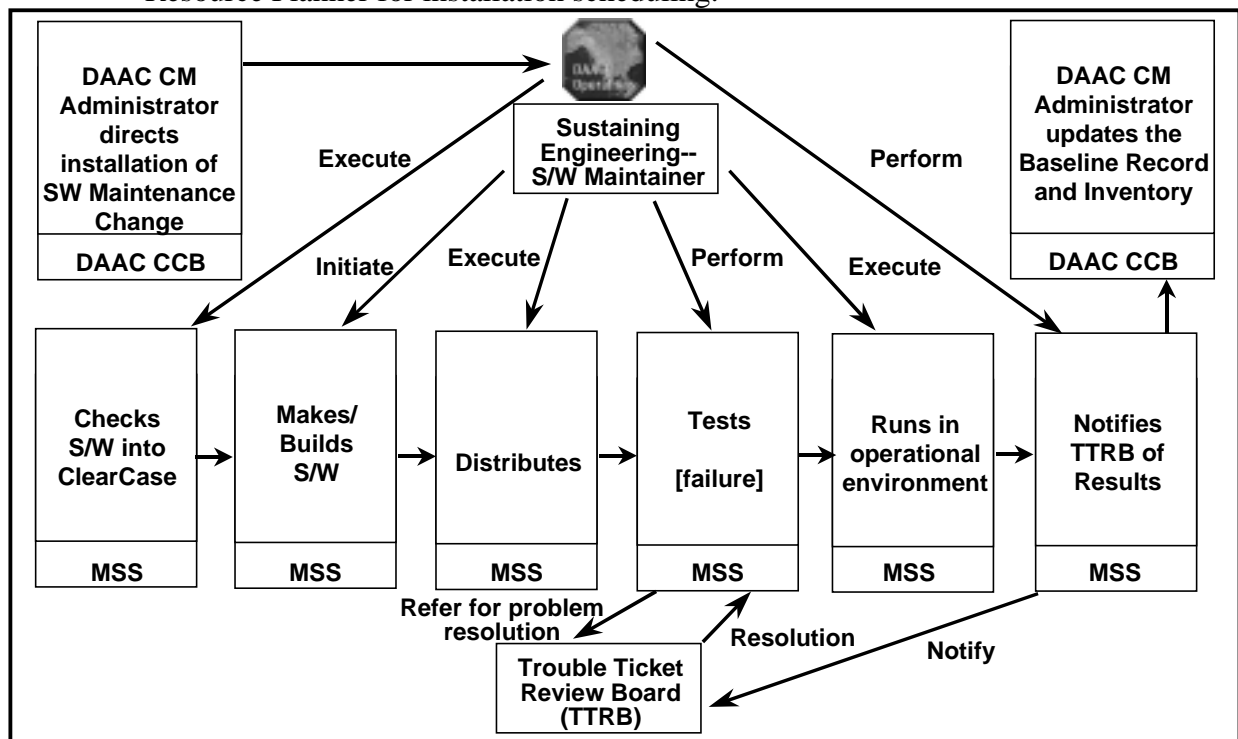
Figure 12. Software Installation Functional Flow

Software Transfer

When the SEO has completed preparation of a software maintenance change package for a change approved by the ESDIS CCB, the SEO CM Administrator requests that the SMC distribute the package. The SMC CM Administrator promotes the change into the Operational Baseline of the Software Change Manager (ClearCase™), the version-controlled Software Library and updates the Baseline Record and Inventory Record using the Baseline Manager tool

and Inventory/Logistical Management tool (XRP-II). If you are a CM Administrator at SMC, and have a requirement to distribute a software update for custom software, you will first use the Software Change Manager to promote the software change package into the Operational Baseline. Figure 13 shows the ClearCase™ File Browser, or main screen.

- Displays the directory name of the current **Versioned Object Base (VOB)**, just below the toolbar. A VOB is defined by several characteristics:
  - A mountable file system to store version-controlled data (e.g., source files, binary files, object libraries, spreadsheets).
  - Can be mounted on some or all workstations.
  - Several VOBs may exist on a machine or network.
  - When mounted as a file system of type MFS, a VOB can be accessed with standard UNIX and ClearCase™ tools.
  - The ClearCase™ file system is transparent.

  A VOB consists of a storage area (for versioned files, derived objects, and cleartext files) and a database (live, shadow, and log file).
- Displays the content of the directory in the space below the directory's name.
- Many Software Change Manager functions can be initiated from the File Browser screen.

One of these functions accessible from the File Browser screen is **Change Promotion Level**, which is one of the choices on the **Promote** pull-down menu.

- Displays a terminal window listing a set of development promotion levels through which the software is expected to go.
- The levels are determined by the type of VOB currently being used.
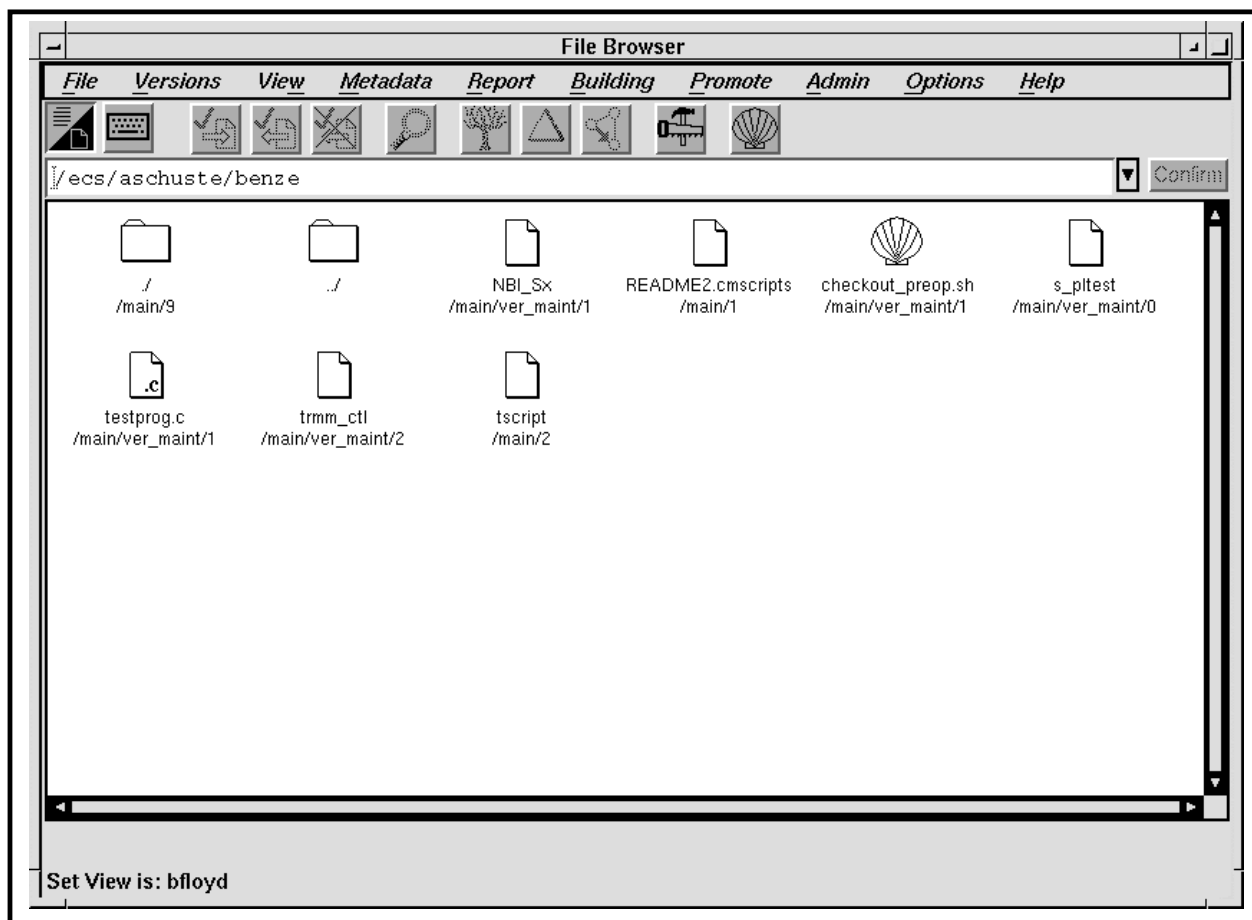
Figure 13. ClearCase™ File Browser Screen (Main Screen)

To promote the change package into the Operational Baseline, use the following procedure (*Note*: You must have CM Administrator privileges to promote software).

Promote Software Change Package using Software Change Manager (ClearCase™)

1   On workstation *x0ais##*, at the UNIX prompt in a terminal window, type
        /usr/ecs/*mode*/COTS/atria/bin/xclearcase & at a UNIX command prompt and then
        press the **Return** key (where *mode* is likely to be **TS1**, **TS2**, or **OPS**).
        • NOTE: The *x* in the workstation name will be a letter designating your site:
          g = GSFC, **m** = SMC, **l** = LaRC, **e** = EDC, **n** = NSIDC, **o** = ORNL, **a** = ASF,
          j = JPL; the **##** will be an identifying two-digit number (e.g., **n0ais01** indicates a
          workstation for algorithm integration and test at NSIDC). If you access the
          workstation through a secure shell remote login (ssh), you must enter
          xhost <remote_workstation_name> and enter **setenv DISPLAY
          <local_workstation IP address>:0.0** prior to the ssh before entering the command
          after the ssh.

- The ClearCase™ **Transcript** screen is displayed as the View Tag Browser loads.
- The ClearCase™ **View Tag Browser** screen is displayed listing available views, including one for the change package which has been developed and tested.

2 Click on the name of the view for the software change package to highlight it, and then click on the **OK** button at the bottom of the screen..

- The ClearCase™ **File Browser** screen is displayed.

3 Use the mouse to display the **Promote** pull-down menu and select the **Change Promotion Level** option.

- A terminal window is displayed listing the promotion levels and asking the operator to select the new **Promotion Level**.

4 Type the number that indicates the desired new promotion level (in this case, **6**, for **Production**), and press the **Enter** key.

5 Type the number that indicates the desired search criteria (i.e., the current state of files to be promoted, in this case, **4**, for **ready_for_production**), and press the **Enter** key.

6 Type an option (in this case, **-f**, to specify a **file**) and the name of a the file to be promoted. Then press the **Enter** key.

- A confirmation dialog box appears. Click on the **Yes** button to confirm that the listed file version is to be promoted
- ClearCase™, using the search criteria, goes through the VOB and promotes the identified file.
- Repeat this step for each file to be promoted for the change package.
- The terminal window displays a message indicating that ClearCase™ is processing the promotion level change.

7 Press the **Enter** key.

- ClearCase™ exits to the **File Browser** screen.

8 To verify that the file version has been promoted, click on the file version to select it and then click on the **Describe icon** (magnifying glass) on the File Browser tool bar.

- The current promotion level attribute value is displayed.
- The state attribute value is displayed, automatically reflecting the initial state for the new promotion level

Update the SMC Software Baseline Record

The next step is to update the Baseline Record to document the software baseline change. The process, tool, and procedure for accomplishing this update are described in detail in a subsequent subsection on Changes to the Baseline. When the Baseline Record update is complete, the SMC CM Administrator completes the transfer.

- Notifies the remote site(s) which will receive the change package.
- Copies and transfers the software change package from the Software Change Manager library to a portable medium.
- Checks the software change package for completeness before dispatch.
- Dispatches the package to the remote site(s).
- Receives confirmation that the package has been received.

Installation at Site using the Software Change Manager (ClearCase™)

The installation at the site is managed through the use of the ECS Software Change Manager tool, ClearCase™. Figure 14 illustrates its role in the process, ensuring that the approved baseline version of a production software is always retained separately from modified versions that may be undergoing testing.
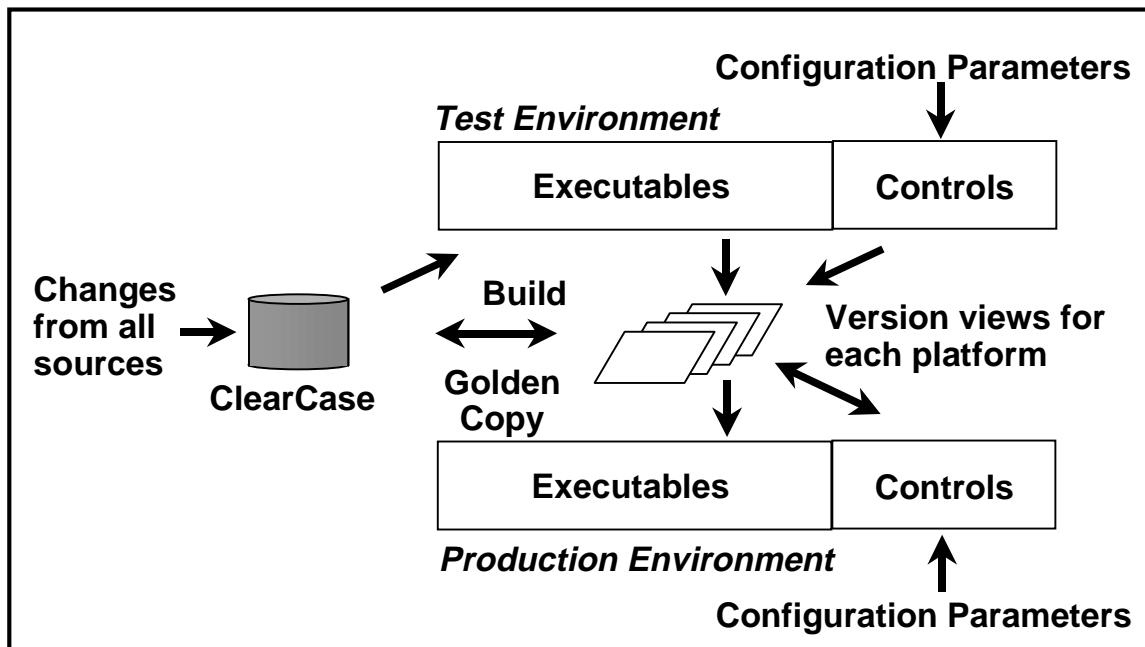
Figure 14. Site Software Installation Using ClearCase™ Software CM Tool

Installation is dependent on Review and approval by ESDIS, and then proceeds systematically:

- the Version Description Document (VDD) gets final updates for system and center-specific material identified by ESDIS or the operational centers, and the final VDD is published.

- the build is installed, along with operational and user documentation.

- ClearCase™: Multiple versions of production software always retained.

- Scripts for System Administrator to do installation.

- controlled document updates are provided to SEO Document Maintenance and entered into the CM system.

- the CM system is updated to reflect M&O and center-specific baselines.

The following procedures document the steps involved in software installation at the site.

Software Transfer and Installation

1   Log into the server platform by typing **username** and then pressing the **Enter** key.

- Cursor moves to the **Password** field.

2   Type the **password** and then press the **Enter** key.

3   Mount the software change package delivery medium (e.g., CD ROM) and put the package on the system by typing **tar xvf /dev/cd0**.

- The software change package directory structure is copied onto the system.

4   To go to the parent directory of the UNIX directory structure to be brought into ClearCase™ (i.e., the software change package), type **cd parentdir** (where **parentdir** is the path of the directory that contains the directory structure to be brought into ClearCase™) and then press the **Enter** key.

- This directory must not be in the VOB.

5   Create a conversion script by typing **clearcvt_unix -r dirname**, where **dirname** is the name of the directory containing the directory structure to be brought into ClearCase™ (i.e., the software change package).

- The command "clearcvt_unix" is a custom command that creates a script to check all the files in **dirname** into the VOB.

- The addition of "-r" to the command ensures that any subdirectories below **dirname** will be recursively included in the script created.

6   At this time the DAAC CM Administrator logs out from this workstation. The DAAC System Administrator (SA) completes the procedure.

- The remaining steps are accomplished by the DAAC SA.

7   Log into the server platform by typing **username** and then pressing the **Enter** key.

- Cursor moves to the **Password** field.

8   Type the **password** and then press the **Enter** key.

9   Double click on the ClearCase™ icon on the System Administration desktop.

- The ClearCase™ **Transcript** screen is displayed as the View Tag Browser loads.

- The ClearCase™ **View Tag Browser** screen is displayed listing available views.

10   To create a view for checking in the software change package, follow menu path **File→New**.

- The cursor appears in a text entry dialog for entry of the new viewname.

11   Type the new **viewname** (e.g., **SAName-ingest1**) and click on the **OK** button.

- The new **viewname** appears in the list of views.

12   Click on the name of the view for the software change package to highlight it, and then click on the **OK** button at the bottom of the screen..

- The ClearCase™ **File Browser** screen is displayed.

13   Type into the directory input box of the **File Browser** the name of the directory in the VOB where the software change package is to be imported and then press the **Enter** key.

Then, to create a subdirectory for the software change package in that VOB, which is a modification to the parent directory (for the VOB) that requires the parent directory to be checked out first, follow menu path **Version→Checkout→Reserved: no comment**.

- In order to add new files to ClearCase™, the directory in which the files are to be added must be checked out first.

- ClearCase™ forces the checkout onto a maintenance branch to isolate the maintenance activity.

- If someone else has already checked out the directory, permission to check out the directory is denied.

14   To prepare to run the conversion script that will check in the files from the software change package, start a shell process in a separate window by clicking on the shell icon button of the **File Browser** toolbar.

- A separate shell window is displayed.

15   To create the new directory under ClearCase™, type **cleartool mkdir -nc directoryname** (where **directoryname** is the name of the new directory) and then press the **Enter** key.

16   To run the script, type **cvt_script** and then press the **Enter** key.

- The SA is the only person who can run the **cvt_script** because it modifies the VOB. All VOB control is kept by the SA for security purposes.

17   To check in the new directory, type into the directory input box of the **File Browser** screen: **path** [where **path** is the full path identification for the new directory (**directoryname**)], and then press the **Enter** key. Then follow menu path **Versions→Checkin**.

18   To check in the parent directory (for the VOB), type into the directory input box of the **File Browser** screen: **VOBpath** (where **VOBpath** is the full path identification for the parent directory, and then press the **Enter** key. Then follow menu path **Versions→Checkin**.

19   On the **File Browser** screen, follow menu path **File→Exit**.

- The ClearCase™ Graphical User Interface session is closed.

Subsequently, the DAAC Software Maintenance Engineer implements and tests the new software:

- Initiates software transfer to compiler hosts for make and build.

- Initiates software distribution.

- Tests individual packages (unit, subsystem, system).

- Runs the full final software in the operational environment.

- Notifies the SMC of the results.

Finally, the DAAC CM Administrator updates the site baseline record using the Baseline Manager (BLM) tool, as described in detail in a subsequent subsection on Changes to the Baseline.

- DAAC CCR Number.
- Software Package Identification.
- Package Name.
- Software Upgrade Name.
- Version.
- File Structure.
- Type.
- Installation Date.

As appropriate, especially for COTS software changes, it may also be necessary to update the inventory and property management records, using the Inventory/Logistics Management (ILM) tool (see subsequent section on Changes to the Baseline).

Hardware Baselines and Changes

The hardware baseline is established at Release Readiness Review (RRR) following formal Physical Configuration Audit (PCA) and Functional Configuration Audit (FCA).

- ESDIS approves the establishment of the operations baseline.
- the configuration baseline is recorded in the Engineering Release Record.
- M&O conducts testing of builds to ensure proper implementation of CCRs with no defects introduced.

Changes to the hardware baselines are anticipated to be infrequent, because the hardware is primarily COTS. In the event of hardware failure, if the repair can be made with a part of the same make, model, and version as the faulty one, there is no need for a CCR because the baseline remains the same. Under some circumstances, however, a CCB action may be necessary. For example:

- *a COTS hardware repair that requires a CCR* -- a COTS hardware problem that is repaired, under emergency conditions and with the approval of the site manager, with a part that does not conform to the baseline (e.g., timely repair is essential and the only spare part available is a later version) requires a CCR to document the configuration change and the authority for the change.
- *a system enhancement* – any change in hardware configuration that occurs in a new release, or as an upgrade, requires a CCR.

Hardware Installation

Repair with part of same make, model, version may be made by the vendor's maintenance technician; the Maintenance Engineer simply records the action and enters the serial number of the new part in the property management system.

If no spare of the baseline make, model, and version is available to make a timely repair for a system that must be returned to service immediately, but a workable part is available (e.g., a later version), the site manager may authorize that part to be used for repair if tests conclude that it works properly. Nevertheless, this constitutes a change that requires the following CM actions:

- preparation of a CCR to document the change.
- review/approval by the site CCB.
- review by SEO/ESDIS to assess impacts/applicability to other sites.
- provision of controlled document updates to SEO Document Maintenance and entry into CM.
- CM system updates (e.g., baseline, inventory) to reflect the approved change.

Hardware Configuration Audits

For hardware installation, the SEO supports FCA/PCA by the Acceptance Testing Organization (ATO) at the Release Readiness Review (RRR). The SEO also conducts internal CM self-audits and supports audits by ESDIS and the ECS Quality Office function. Self audits evaluate

compliance with the EOS Configuration Management Plan (CMP) and the ESDIS CMP. The CM self-audits verify:

- that CM policies, procedures, and practices are being followed.
- that approved changes to documentation and products are properly implemented.
- that the as-built documentation of each configuration item agrees with the as-deployed configuration or that adequate records of differences are available at all times.

The SEO prepares a post-audit report outlining the specific items audited, audit findings, and corrective actions to be taken. All action items are tracked to closure.

In support of formal audits scheduled and conducted by ESDIS, the SEO assists in validating that each ECS configuration item is in conformance with its functional and performance requirements defined in the technical documentation. These audits validate that:

- the as-built configuration compares directly with the documented configuration identification represented by the detailed configuration item specifications.
- test results verify that each ECS product meets its specified performance requirements to the extent determinable by testing.
- the as-built configuration being shipped reflects the final tested configuration. Any differences between the audited configuration and the final tested configuration are documented.
- when not verified by test, the compatibility of ECS products with interfacing products or equipment is established by comparison of documentation with the interface specifications which apply.
- COTS products are included in audits as integral parts of the ECS baseline.

Changes to the Baseline

Changes to configuration items typically require use of several software tools for their management, implementation, and documentation. We have seen how the Change Request Manager, DDTS, is used for Configuration Change Requests, and how the Software Change Manager, ClearCase™, is used for the installation of approved software changes. This subsection provides a brief review of the role of the Management Subfunction Trouble Ticket software in baseline changes, and then addresses the use of two additional tools:

- the Baseline Manager (BLM)– an XRP-II application for maintaining data defining the ECS baseline and recording changes to that baseline.
- the Inventory/Logistical Management (ILM) tool – an XRP-II application for maintaining records related to inventory changes (e.g., item identification data, such as serial numbers, part numbers, manufacturers, vendors, or other data).

Management Subfunction and Trouble Ticket System

You will no doubt remember that the impetus for a change may often be a system event that results in a Trouble Ticket. Many changes involve the management subfunction software. Specifically, the management software includes the Trouble Ticket System (TTS), which is a tool used at the DAACs, SMC, and EOC to record and report problems with ECS. Most of the problems encountered are fixed locally, but some problems involve system-level issues. For those, the SEO may use a TT Telecon to discuss the issues. Problems that may have such system-level implications are those that may be related to groups of trouble tickets (TTs), that may affect more than a single site, that must be referred to the ESDIS Project Office and the ECS development organization, or that require coordination for multi-site change implementation.

Figure 15 shows the flow of a TT and related CCR through the various CCBs and the TT Telecon. Circled numbers on the figure indicate key elements in the flow:

1. An approved TT is discussed at a TT Telecon.
2. At the Telecon, a decision is made whether to escalate the resolution of the TT.
3. If the decision is to escalate, rather than resolve the issue with a local solution, a CCR is proposed.
4. A CCR Telecon and related deliberations may result in iterations of rework, entailing related CCRs, responsibility for the affected configuration items, impact analysis, and other activities to optimize the resolution.
5. The site CCB deliberates on the CCR.
6. The site CCB forwards the CCR with recommendations to the ESDIS CCB.

625-CD-012-002
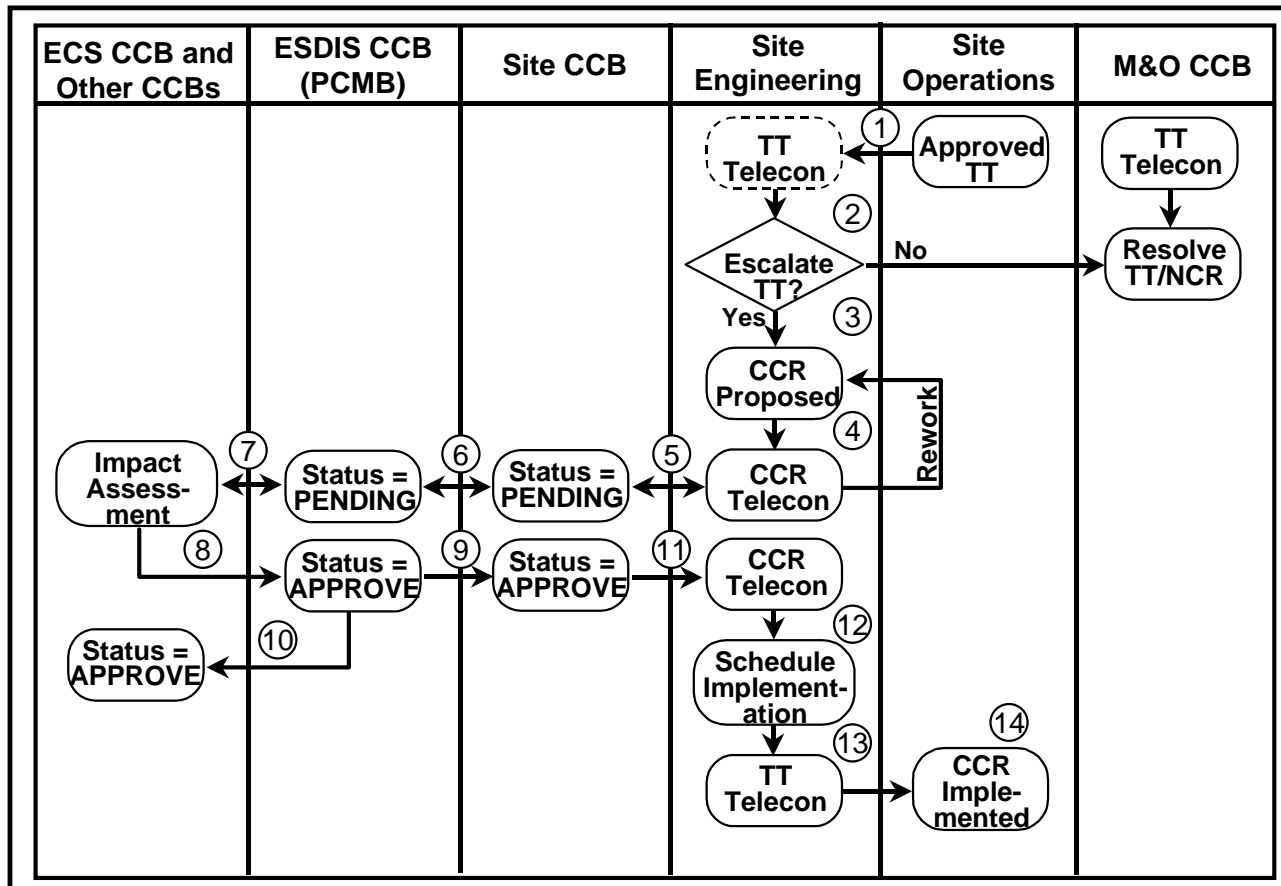
Figure 15. CCR Approval Flow

7. As necessary, the ESDIS CCB forwards the CCR to the ECS CCB and other CCBs for impact assessment.
8. If appropriate, elements 5, 6, and 7 may be iterated in rework with additional deliberations and feedback, with possible disapproval. Otherwise, the CCR is approved for further action by the ESDIS CCB.
9. If the ESDIS CCB approves the CCR, it may issue CCR Implementation Instructions to the site CCB.
10. If the CCR entails additional development affecting ECS, the ESDIS CCB may issue CCR Implementation Instructions to the ECS CCB and/or other CCBs.
11. The site CCB issues CCR implementation directives, and their status is monitored and coordinated with the SEO through a CCR Telecon.
12. The CCR Telecon also coordinates the schedule for implementation of changes that is reported back to the TT Telecon.
13. The TT Telecon monitors the scheduled implementation.
14. At the conclusion of the scheduled implementation, the CCR is verified.

625-CD-012-002

Baseline and Inventory Management: Processes

The ECS provides BLM and ILM tools to assist in documenting changes to the baseline and inventory, and to maintain a historical record of those changes. The tools are used in the System Monitoring and Coordination (SMC) function to maintain system-level records, and at operational sites to maintain site-level records. Sometimes it is appropriate for a tool to be used at the system level (e.g., to specify the nature and effective date of a change to the system baseline), with a transfer of appropriate records to the sites to reflect the change. As another example, some functions are typically not exercised at the site level (e.g., purchasing of system equipment), and therefore ILM records related to those functions (e.g., purchase orders, vendor data) are not maintained at the sites. The tools are applied at the sites, however, to prepare and maintain site-specific records. For SMC system-level comprehensive documentation (e.g., records reflecting baselines or inventory at all sites), site-specific records are transferred to the SMC BLM/ILM systems.

Baseline Terms and Concepts

Baseline management is a process to identify and control baselined versions of hardware and software, to provide a standard configuration of systems throughout all sites, and allow unique site-configured systems and baselines. It identifies interdependencies between hardware and software items, and permits maintenance of a complete history of baseline changes throughout the life of the project. For ECS baseline management and BLM tools, it certain terms and concepts are key to understanding how data on the system baseline are stored and tracked.

Control Item –   any ECS item under version control by Configuration Management.

Configuration Item –   an aggregation of hardware, firmware, software, or any discrete component or portion, which satisfies and end user function and is designated for configuration control.

Baseline –   a configuration identification document or set of such documents formally designated by the Government at a specific time during the life cycle of a configuration item (CI).

Configured Article –   a control item reportable as part of the Configured Articles List (CAL).

CIL –   a Configuration Items List (CIL) identifies the approved set of CIs that are subject to CM requirements and procedures.

CAL –   a Configured Articles List (CAL) describes all CIs, critical item hardware and software, and supporting documentation by which the exact configuration definition of the hardware and software can be determined.

Additional terms, some of which address specific entries in the BLM tool, further define how data on the system baseline items and structure are tracked.

Assembly –   an item made up of other items. A *Parent* item is a higher-level item (e.g., an assembly), which may have one or more *Child* items, or components.

Bill of Material –   the list of items that comprise an assembly.

Product Structure –	the parent-child pairings that define the bill of material for an assembly; each product structure record specifies the effective dates and quantities for a single component of a parent for each engineering change.
Active Date –	the date a component becomes effective in an assembly's bill of material.
Inactive Date –	the date a component is no longer effective in an assembly's bill of material.
Engineering Change –	a mechanism for grouping, reporting, and controlling product changes collectively
Revision –	the sequence number of a product structure change to an assembly; it signifies a change to the configuration of an assembly that does not alter its form, fit, or function.
Implementation Status –	a record describing the deployment of a control item to a site and the current state and associated date of its implementation; each control item has one record for each site to which it is deployed.
Exporting Data –	creating a formatted file or records extracted from the BLM database; control item engineering change, product structure, and interdependency records may be extracted and sent to another BLM site via ftp.
Importing Data –	loading BLM data from a formatted file.

At the lowest level, the baseline is composed of configured articles that are the specific types of items that make up ECS and are tracked using the BLM tool. It is important to recognize, however, that we impose a conceptual structure on those configured articles to help us think about the system. In fact, it is possible to conceptualize the structure of the system in a number of different ways, and we may select a different conceptual structure based on the requirements of the situation. The ECS baseline management approach and the BLM tool permit recording and tracking these different conceptual baselines, which can be related to the same records of the configured articles.

For example, system designers may conceptualize the system in terms that will help them track subsystems and the configuration items for which each subsystem team is responsible. This may produce a baseline structured according to a design view, such as that illustrated in Figure 16.
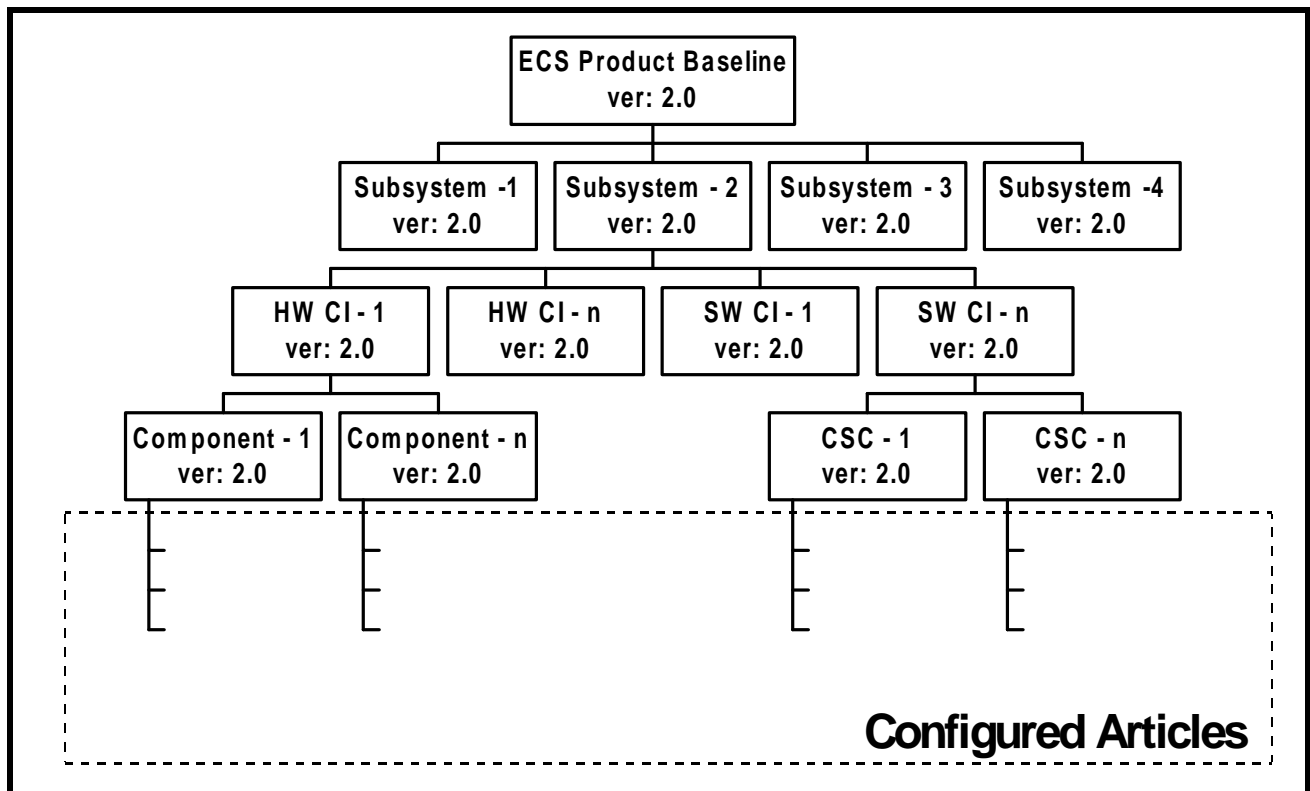
Figure 16. ECS Baseline Concept from a Design (CIL/CAL) View

At an operations site, the concept reflected in the upper layers of the Design View baseline structure may not be particularly useful. Although the same configured articles are involved, it may be desirable, for instance, to track items from the viewpoint of network administration. The resulting baseline product structure may reflect that shown in Figure 17.

Even if an operations site is to view ECS product structure as composed of subsystems, it is likely that the concept of CIs will be of little use. Instead, the site is likely to be focused on what hosts make up the subsystems. Therefore, the subsystem view at an operations site may be similar to that illustrated in Figure 18.

When the Baseline Manager database is installed at a site, it will reflect ECS-developed product structures, and site personnel will not normally need to enter all the data necessary to define these product structures. Instead, BLM tasks are likely to be limited to areas such as processing changes and entering site-unique data. However, an understanding of the different ways of conceptualizing the system will help in interpreting baseline data reflected in the BLM.
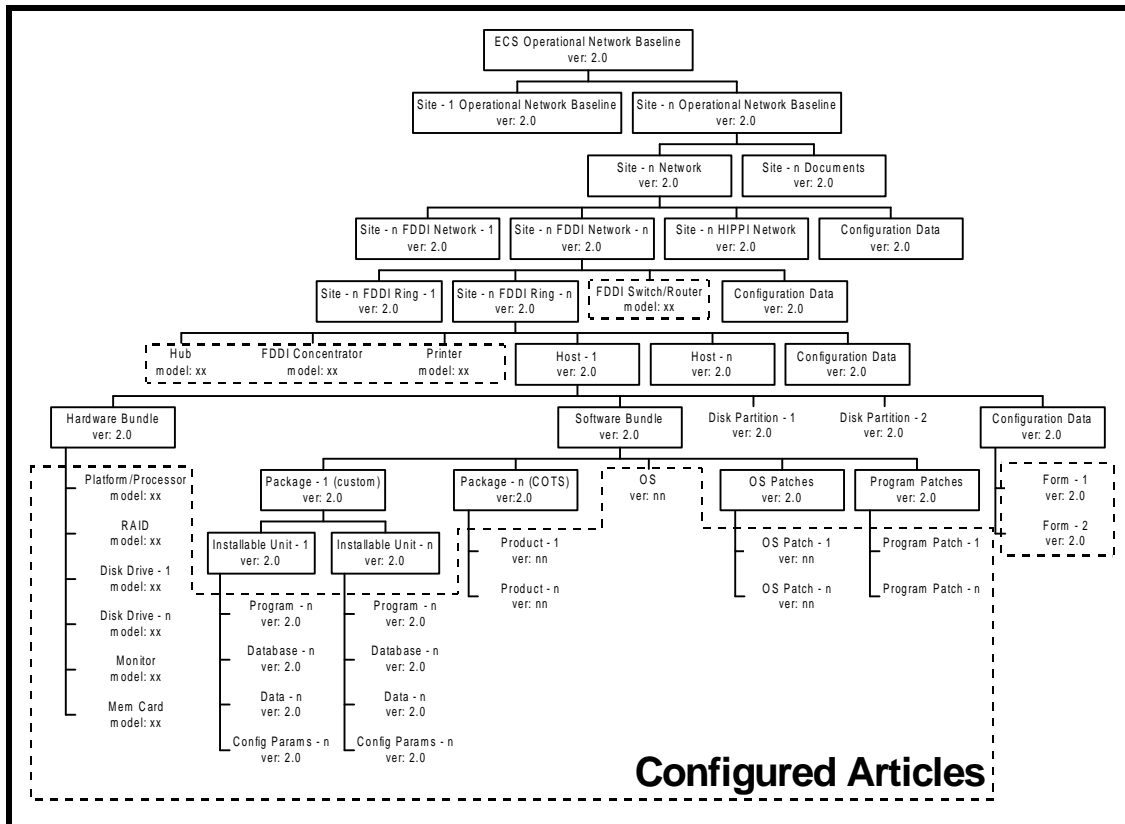
Figure 17. ECS Baseline Concept from an Operational (Network) View
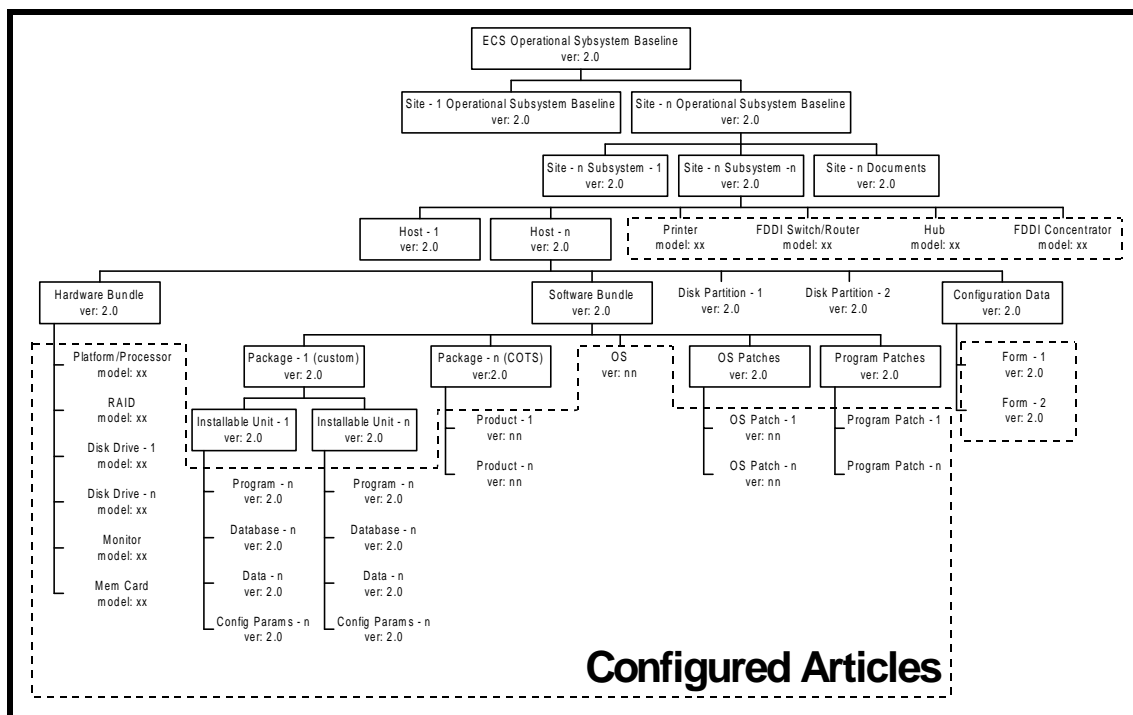
Figure 18. ECS Baseline Concept from an Operational (Subsystem) View

625-CD-012-002

Baseline and Inventory Management: Tools

The Baseline Manager (BLM) tool and the Inventory/Logistical Management (ILM) tool are applications of XRP-II. The main screen of XRP-II, illustrated in Figure 19, permits access to four menus (*Note*: Depending on the access level established for you by the XRP-II administrator, you may not have access to all of the menus):

- **Baseline Management** menu provides access to functions for maintaining control item and bill of material information.

- **ILM Main Menu** provides access to functions for Inventory/Logistical Management (ILM) services, including entry and management of EIN (Equipment Identification Number) information and management of the EIN structure for the ECS inventory.

- **System Utilities Menu** provides access to functions for maintaining information that spans functional domains, and for importing and exporting records.

- **System Tools** menu provides access to functions for managing the security, health, and configuration of XRP-II.
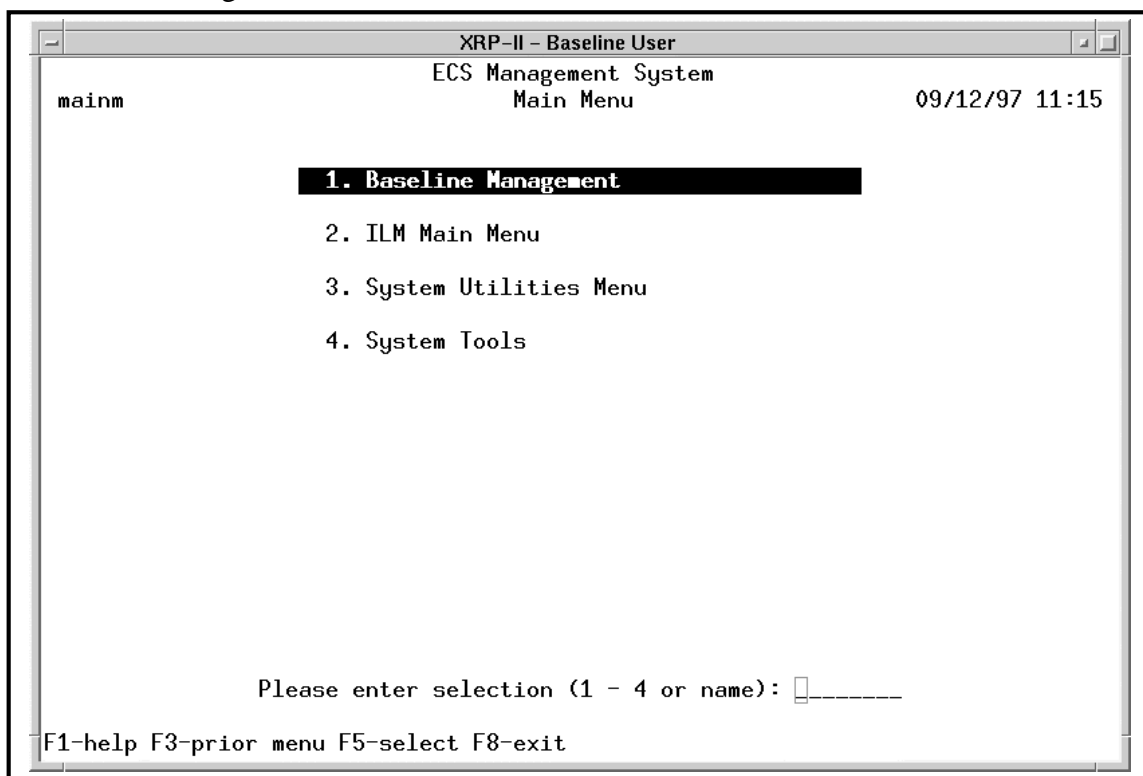
Figure 19. XRP-II Main Menu Screen for Baseline Manager and Inventory/Logistical Management

The user interface for XRP-II is a Character User Interface (CHUI). The various screens are accessible through navigation of the hierarchical menu structure illustrated in Figure 20 (1 - 3). Data concerning one or more control items can be added, modified, or deleted by selecting

Main

Baseline Management | **ILM Main Menu** | **System Utilities Menu** | **System Tools**

Control Item Master
- All Control Items
- Hardware Items Only
- Software Items Only
- Host Items Only
- Document Items Only
- Disk Partition Items Only

Query Menu
- Control Items Query
- Hardware Items Query
- Software Items Query
- Host Items Query
- Document Items Query
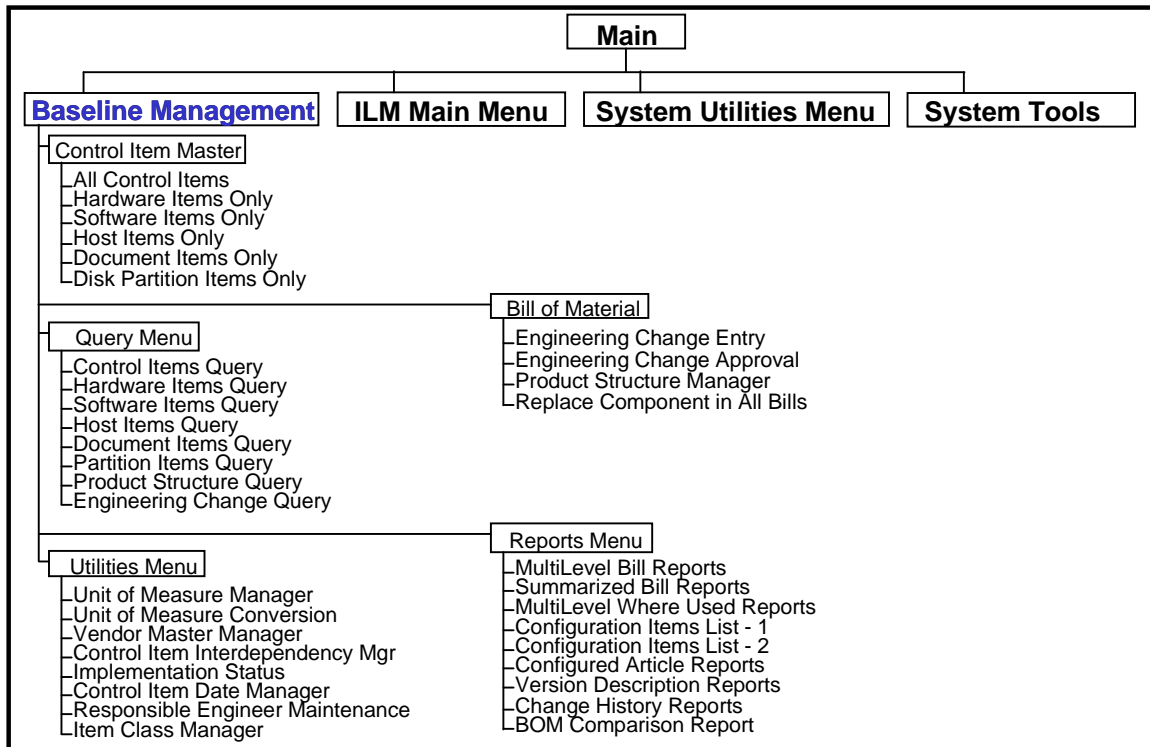- Partition Items Query
- Product Structure Query
- Engineering Change Query

Bill of Material
- Engineering Change Entry
- Engineering Change Approval
- Product Structure Manager
- Replace Component in All Bills

Utilities Menu
- Unit of Measure Manager
- Unit of Measure Conversion
- Vendor Master Manager
- Control Item Interdependency Mgr
- Implementation Status
- Control Item Date Manager
- Responsible Engineer Maintenance
- Item Class Manager

Reports Menu
- MultiLevel Bill Reports
- Summarized Bill Reports
- MultiLevel Where Used Reports
- Configuration Items List - 1
- Configuration Items List - 2
- Configured Article Reports
- Version Description Reports
- Change History Reports
- BOM Comparison Report

Figure 20. XRP-II Hierarchical Menu Structure (1 of 3)

Main

Baseline Management | **ILM Main Menu** | **System Utilities Menu** | **System Tools**

EIN Transactions
- EIN Installation
- EIN Shipment
- EIN Transfer
- EIN Archive
- EIN Relocation
- Inventory Transaction Query

EIN Menu
- EIN Entry
- EIN Manager
- EIN Structure Manager
- EIN Inventory Query

Inventory Ordering Menu
- Order Point Parameters Manager
- Generate Order Point Recommendations
- Recommended Orders Manager
- Transfer Order Point Orders
- Consumable Inventory Query
- Spares Inventory Query
- Transfer Consumable & Spare Mat'l

ILM Report Menu
- ILM Inventory Reports
- EIN Structure Reports
- Install/Receipt Report
- EIN Shipment Reports
- Transaction History Reports
- PO Receipt Reports
- Installation Summary Reports

Maintenance Menu
- Maintenance Codes
- Maintenance Contracts
- Authorized Employees
- Work Order Entry
- Work Order Modification
- Preventative Maintenance Items
- Generate PM Orders
- Work Order Parts Replacement History
- Maintenance Work Order Reports
- Work Order Status Reports

ILM Master Menu
- Employee Manager
- Assembly Manager
- System Parameters Manager
- Inventory Location Manager
- Buyer Manager
- Hardware/Software Codes
- Status Code Manager
- Report Number
- Export Inventory Data
- Transaction Log
- Transaction Archive
- OEM Part Numbers
- Shipment Number Manager
- Carriers

PO/Receiving Menu
- Material Requisition Manager
- Material Requisition Master
- Purchase Order Entry
- Purchase Order Modification
- Purchase Order Print
- Purchase Order Status
- Receipt Confirmation
- Print Receipt Reports
- Purchase Order Processing
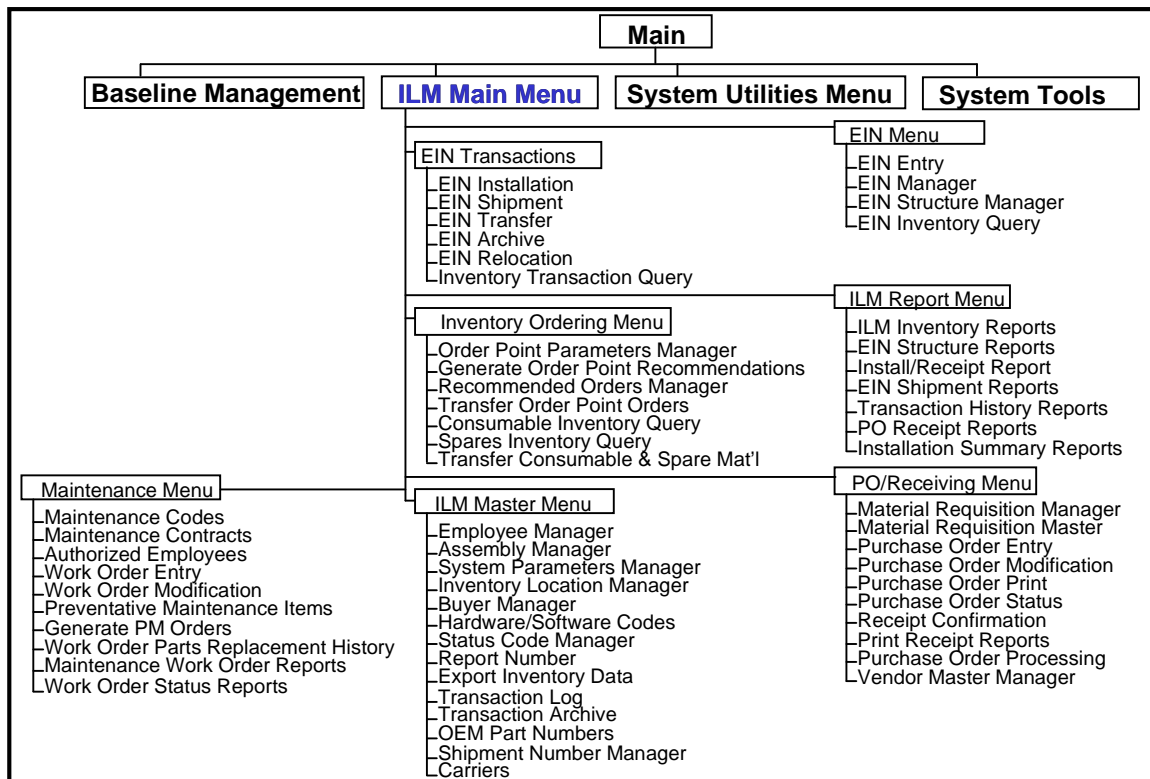- Vendor Master Manager

Figure 20. XRP-II Hierarchical Menu Structure (2 of 3)
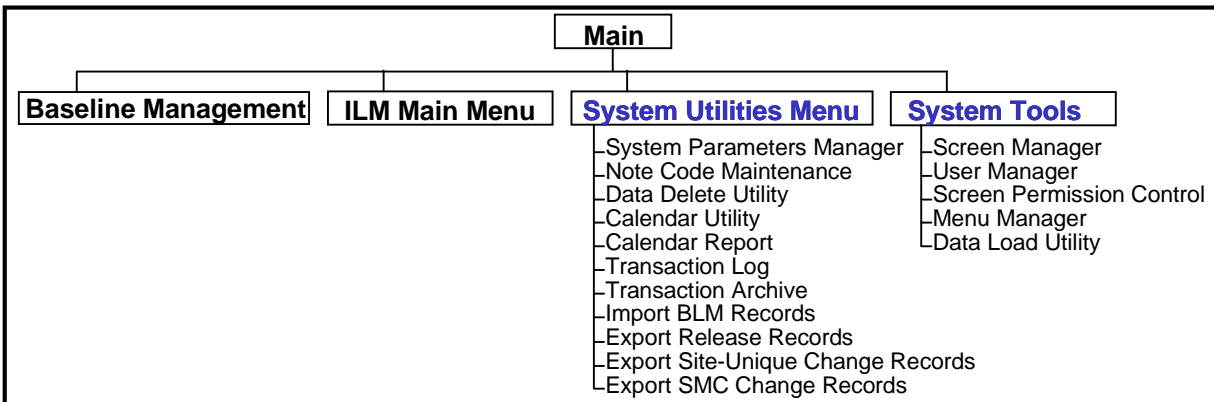
Figure 20. XRP-II Hierarchical Menu Structure (3 of 3)

an appropriate data entry screen from the Control Item Master Menu. Data entry screens permit modification of the master file (or catalog) that describes control items individually. Each screen accesses a particular set of records and contains a unique set of fields corresponding to a control item's class. All screens function in the same way, and use bottom-line commands such as those shown in the **Software Items Only** details screen illustrated in Figure 21.

Figure 21. XRP-II Software Items Only CHUI

Baseline Manager (BLM)

To understand the use of the BLM software, consider as an example a software change consisting of a revised Graphical User Interface (GUI) package for the ECS Ingest application. The revised GUI package is considered a new software element, one of several elements in the collection, or "catalog," of control items that make up the Operator Ingest Interface (I/F) Computer Software Component (CSC) assembly in the ECS product structure. To document the change, it is necessary to add the new element to the catalog of version-controlled items, define an engineering change for the Operator Ingest I/F CSC assembly, and include the element in the list of items that will now make up that assembly.

Therefore, to update the baseline records for this software change, you will need to add records: a) to define the new item, b) to specify its place in the product structure (i.e., what assembly it belongs to) through an engineering change notice, and c) list the item(s) that constitute the change. The updates will use the Software Items Only screen previously illustrated in Figure 21, and will require the use of an **Engineering Change** screen, shown in Figure 22, as well as an **Item List** form accessible through a menu choice on the Engineering Change Entry screen. The following procedure illustrates the use of the Baseline Manager tool and these screens to accomplish the update (*Note*: You must have XRP-II privileges to perform the update).

Figure 22. XRP-II BLM Engineering Change Screen

Update the Baseline Record using the Baseline Manager Tool

1   On workstation *x*0mss##, at the UNIX prompt in a terminal window, type **pcs** *<ipaddress>* **xterm** at a UNIX command prompt and then press the **Return** key.
- NOTE: The *x* in the workstation name will be a letter designating your site: **g** = GSFC, **m** = SMC, **l** = LaRC, **e** = EDC, **n** = NSIDC, **o** = ORNL, **a** = ASF, **j** = JPL; the *##* will be an identifying two-digit number (e.g., **n0mss02** indicates a management services subsystem workstation at NSIDC). If you access the workstation through a secure shell remote login (ssh), you must enter **xhost <remote_workstation_name>** and enter **setenv DISPLAY <local_workstation IP address>:0.0** prior to the ssh before entering the command after the ssh. The *<ipaddress>* is the ip address of *x*0mss##, and **xterm** is required when entering this command on a Sun terminal.
- A script is executed which determines the operator's terminal type from the environment, prompts for a terminal ID, and establishes a Baseline Manager/ILM operating environment. XRP-II is then started and the **Main Screen** is displayed.

2   Type the number **1** (for **Baseline Management**) and press the **Enter** key.
- The **Baseline Management** menu screen is displayed.

3   Type the number **1** (for **Control Item Master**) and press the **Enter** key.
- The **Control Item Master** menu screen is displayed.

4   Type the number **3** (for **Software Items Only**) and press the **Enter** key.
- A "Selecting items . . ." message is briefly displayed, and then the **Software Items Only** CHUI screen is displayed, populated with data for the first record.

5   Type "**/A**" (for **A**dd).
- The fields are cleared and the cursor is at the entry field for **Control Item ID:**, with a note stating "RETURN for next."

6   Press the **Enter** key.
- The system generated **Control Item ID** is displayed in the text field and the cursor moves to the **NAME:** field.
- Make a written note of the **Control Item ID**, which you may need to enter on another form later in the exercise; you can find it using system functions, but it may be handy to have it written down.

7   Type the name of the element (for this exercise, type "**Training: GUI change**") and then press the **Enter** key.
- The typed entry is displayed in the **NAME:** field.
- The cursor moves to the **MNEMONIC:** field.

8   To bypass entry of a Mnemonic, which is not required, press the **Enter** key.
- The cursor moves to the **DESCRIPTION:** field.

9   Type a description (e.g., "**Training: Catalog element for GUI change**" and then press the **Enter** key.
- The typed entry is displayed in the field, and a selection zoom box for the next field, **Item Class:**, is displayed, showing choices of **baseline**, **software**, **hardware**, **other**, **partition**, **host**, **system**, **design**, **network**, and **document**.

10   Use the keyboard arrow keys to move to the cursor to **software**, and then type **T** (for Tag) to select, or "Tag," the selection (**software**).

   - The selection is highlighted to indicate that it is tagged.

11   Type **Q** (for **Q**uit), and then press the **Enter** key.

   - The selection (**software**) appears in the **Item Class:** field.
   - The cursor moves to the **ITEM SUBCLASS:** field.

12   Type **Interfaces -GUI** and then press the **Enter** key.

   - Although entry in the **ITEM SUBCLASS:** field is not required, and it may be bypassed by just pressing the **Enter** key, entries in this field are useful for searching and sorting in preparation of reports. Software subclasses typically will include such entries as **application**, **API**, **DBMS**, **utility**, **tool**, **operating system (OS)**, **patch**, **OS patch**, **bundle**, and others.
   - The cursor moves to the **VERSION:** field.

13   If there is a version identified for the changed software element, enter it here. For this exercise, type "**1.2**" and then press the **Enter** key.

   - The typed entry appears in the **VERSION:** field.
   - The cursor moves to the **PRED ITEM:** field.

14   If you know the Baseline Manager **Control Item ID** for the Predecessor item (in this case, for the old GUI package for Ingest), enter it in the **PRED ITEM:** field and then press the **Enter** key. For this exercise, type "**ECS-000000**" and then press the **Enter** key.

   - The typed entry appears in the **PRED ITEM:** field.
   - The cursor moves to the ***CONFIG ARTICLE:** field (the "*****" indicates that entry is required).

15   Type "**Y**" and then press the **Enter** key.

   - The typed entry appears in the ***CONFIG ARTICLE:** field.
   - The cursor moves to the ***PLANNING RESOURCE:** field (the "*****" indicates that entry is required).

16   Type "**N**" and then press the **Enter** key.

   - The typed entry appears in the ***PLANNING RESOURCE:** field.
   - The cursor moves to the **SCOPE:** field.

17   Type "**C**" (for **C**ore; other choices are "S" for site-**S**pecific, "U" for site-**U**nique, and "O" for **O**ther) and then press the **Enter** key.

   - The typed entry appears in the **SCOPE:** field.
   - The cursor moves to the **IMPLEMENTATION STATUS:** field.

18   For this exercise, to bypass the **IMPLEMENTATION STATUS:** field, press the **Enter** key.

   - The **IMPLEMENTATION STATUS:** field is a shortcut to the control item implementation status table containing the list of sites to which a control item is deployed, together with the installation date and implementation status of the control item at each site. It permits the option of typing "**/Z**" to Zoom out to the table, where you can add or update implementation status records.
   - A selection zoom box for the next field, **DEVELOPER:**, is displayed, showing choices of coded names of companies/organizations that produced the control item.

19   This exercise addresses custom software developed by ECS, but ECS is not in the displayed list. Therefore, type "**Q**" (for **Q**uit).
- The displayed list disappears, and the cursor is left in the **DEVELOPER:** field.

20   Type "**ECS**" and then press the **Enter** key.
- The typed entry appears in the **DEVELOPER:** field.
- The cursor moves to the **RESP ENG:** field.

21   Type "**/Z**" to zoom out to a table listing responsible engineers' names, addresses, and phone numbers.
- The data for the first responsible engineer are displayed. You may scroll up and down the list by typing "**N**" (for Next) or "**P**" (for Prior), or, you may type "**V**" to switch the view to display the data for several engineers in columns.
- If the name you need is not in the list, you may add data for the responsible engineer by typing "**/A**" (for **A**dd) and filling in the fields.

22   When you have the cursor at the **ENGINEER:** field for the responsible engineer you want to select, type "**T**" (for **T**ag) to tag that engineer for entry into the **RESP ENG:** field.
- The tagged entry is highlighted.

23   Type "**Q**" (for **Q**uit).
- The number for the responsible engineer is displayed in the **RESP ENG:** field.
- The cursor moves to the **COMMODITY CODE:** field.

24   Type "**/Z**" to zoom out to a table listing classifications for how the item was produced or obtained.
- A selection zoom box appears with a pick list; choices are **mod-COTS** (modified COTS), **GFE**, **freeware**, **custom**, **sharewar** (shareware), **other**, and **heritage**.

25   Use the keyboard arrow keys to scroll down to **custom**, and then type "**T**" (for Tag) to tag the selection for entry into the **COMMODITY CODE:** field.
- The selection is highlighted.

26   Type "**Q**" (for **Q**uit).
- The selection (**custom**) is displayed in the **COMMODITY CODE:** field.
- The cursor moves to the **OEM PART:** field.

27   Other fields on the **Software Items Only** CHUI are not required entry fields. Therefore, this completes the entries on this screen for now. Type "**Q**" (for **Q**uit) or press the **F3** key to return to the **Control Item Master** menu.
- The **Control Item Master** menu is displayed.

28   Press the **F3** key to return to the **Baseline Management** menu.
- The **Baseline Management** menu is displayed.

29   To select **Bill of Material**, type "**2**" and then press the **Enter** key.
- The **Bill of Material** menu is displayed.

30   To select **Engineering Change Approval** (the screen used to create a record for an approved change), type "**2**" and then press the **Enter** key.
- A "Selecting items . . ." message is briefly displayed, and then the **Engineering Change Approval** CHUI screen is displayed, populated with data for the first record.
- The **Engineering Change Approval** screen is used to add approved engineering changes in the BLM, and should be used for all entries of CCB-approved changes.

31 Type "**/A**" (for **A**dd).
- The fields are cleared and the cursor is at the entry field for **Parent Part:**.

32 Type "**/Z**" to display a table of control items from which to select a **Parent Part**.
- A selection zoom box is displayed showing, in columns, Control Items, Names, and Mnemonics.

33 Type "**S**" to initiate a search for selected items.
- A message is displayed instructing "SELECT: enter field(s) to be selected then ▮F5▮-start (▮-clear ▮-cancel) . . ." followed by a field to enter the search string.

34 To move the selection field under the Name column in the zoom box, press the **Enter** key.
- The field for entry of the search string moves to the right, under the Name column.

35 To search the list for the name **Operator Ingest I/F CSC**, Type "**Operator***" and then press the **F5** key.
- The selection zoom box displays the Control Item ID and Name for the **Operator Ingest I/F CSC**.

36 Type "**T**" (for **T**ag) to tag the selection for entry into the **Parent Part:** field.
- The tagged entry is highlighted.

37 Type "**Q**" (for **Q**uit).
- The Control Item ID for the Operator Ingest I/F CSC is displayed in the **Parent Part:** field.
- The cursor moves to the **Engineering Change:** field, with a note "RETURN for null".

38 Type the number or identifier of the Engineering Change Notice (for this exercise, type **Training**) and then press the **Enter** key.
- The screen displays the typed information in the **Engineering Change:** field, displays the Control Item Name (in this case, **Operator Ingest I/F CSC**), in the **Name:** field, and populates the **Date Entered:**, **Operator ID:**, **Active Date:**, and **Inactive Date:** fields.
- The cursor moves to the **PROJECT:** field.

39 Type **ECS** and then press the **Enter** key.
- The cursor moves to the **APPROVAL CODE:** field.

40 Type "**A**" (for **A**pproved) and then press the **Enter** key.
- The cursor moves to the **APPROVAL DATE:** field, with an unspecified date provided as ∗∗/∗∗/∗∗.

41 Type the date on which the change was approved, in the format mm/dd/yy, and then press the **Enter** key. For this exercise, use today's date.
- The cursor moves to the **CCR #:** field.

42   Entries in the fields **CCR #:**, **TT:**, **SORT ORDER:**, **DRAWING:**, **REVISION:**, **IMPLEMENTATION CODE:**, and **BASELINE / RELEASE:** are not mandatory; to bypass a field, just press the **Enter** key, continuing until the cursor is at the **ACTIVE DATE:** field.

- If there are associated data (e.g., if the Engineering Change is associated with a CCR and/or Trouble Ticket, or if there is a relevant engineering drawing), enter the relevant data in the appropriate fields (e.g., enter the CCR ID number, enter the TT ID number, enter the Drawing identification) before you press the **Enter** key.
- If you wish to enter data to be used in later sorting or manipulating the data base (e.g., Sort Order, Implementation Code), enter the relevant data in the appropriate fields before you press the **Enter** key.
- The cursor moves to the next field; when the cursor reaches the **ACTIVE DATE:** field, do not press the **Enter** key to bypass the field.

43   Type today's date, using format mm/dd/yy, and then press the **Enter** key.

- The cursor moves to the **INACTIVE DATE:** field.

44   Press the **F3** key to exit from the **A**dd mode.

- If you press the **Enter** key instead, the bottom line menu changes to show function key options; you still need to exit from the **A**dd mode (by pressing the **F3** key).
- The screen shows the data you have added, with the bottom line menu offering choices available for the change.

45   Press **I** (for **I**tems).

- The BLM enters the Add mode for items and the screen displays an entry form for listing the items in the Engineering Change that are to be added to the Parent Part at the effective date of the Engineering Change notice; the form header data reflects the Engineering Change Entry for the Parent Part, and the cursor is in the first column, labeled **COMPONENT**.

46   Type "**/Z**" to display a table of control items from which to select a **Component**.

- A selection zoom box is displayed showing, in columns, Control Items, Commodities, Names, Mnemonics, and Status.

47   Type "**S**" to initiate a search for selected items.

- A message is displayed instructing "SELECT: enter field(s) to be selected then ▮▮-start (▮ -clear ▮ -cancel) . . ." followed by a field to enter the search string.

48   To move the selection field under the Name column in the zoom box, press the **Enter** key twice.

- The field for entry of the search string moves to the right, under the Name column.

49   To search the list for the name of the item you are adding to the baseline (**Training: Catalog element for GUI change**), Type "**Training***" and then press the **F5** key.

- The selection zoom box displays the Control Item ID and Name for the items beginning with "**Training**," including **Training: Catalog element for GUI change**.

50   If necessary, use the keyboard arrow keys to scroll up or down the list until the cursor is at the desired entry (**Training: Catalog element for GUI change**); then type "**T**" (for **T**ag) to tag the selection for entry into the **Component** list.

- The tagged entry is highlighted.

51   Type "**Q**" (for **Q**uit).
- The Control Item ID for the **Training: Catalog element for GUI change** is displayed in the **Component** column in the items form, and other associated data populates other columns on the form.

52   To document that the predecessor item will no longer be part of the baseline, type **/A** to add the predecessor item and document its Inactive Date.
- The screen displays the cursor in a blank entry field in the **COMPONENT** column.

53   Type "**/Z**" to display the table of control items from which to select a **Component**.
- A selection zoom box is displayed showing, in columns, Control Items, Commodities, Names, Mnemonics, and Status.

54   Type "**S**" to initiate a search for selected items.
- A message is displayed instructing "SELECT: enter field(s) to be selected then ■F5■-start (█-clear █-cancel) . . ." followed by a field to enter the search string.

55   To move the selection field under the Name column in the zoom box, press the **Enter** key twice.
- The field for entry of the search string moves to the right, under the Name column.

56   To search the list for the name of the predecessor item you are adding to the baseline (**Training: Predecessor GUI Item**), Type "**Training***" and then press the **F5** key.
- The selection zoom box displays the Control Item ID and Name for the items beginning with "**Training**," including **Training: Predecessor GUI Item**.

57   If necessary, use the keyboard arrow keys to scroll up or down the list until the cursor is at the desired entry (**Training: Predecessor GUI Item**); then type "**T**" (for **T**ag) to tag the selection for entry into the **Component** list.
- The tagged entry is highlighted.

58   Type "**W**" (for **W**here) to obtain a Control Items Query screen showing where the item is used.
- The Control Items Query screen is displayed showing the Parent Part(s) where the component is used, with data including Active and Inactive Dates..

59   Make a written note of the Active Date and the Inactive Date for the component in question; ensure you use the data from the Parent Part that is the subject of the Engineering Change Approval you are preparing, and type "**R**" for (**R**ight) to scroll to the right as necessary to see the needed information.
- It is necessary to note these dates so you can enter valid data on the items list. Because the items list screen takes the Active Date and Inactive Date for each item from the dates on the Engineering Change Approval screen, you will need to enter these dates manually.

60   Type "**Q**" (for **Q**uit).
- The Control Items List where you tagged a component is redisplayed.

61   Type "**Q**" (for **Q**uit).
- The Control Item ID for the **Training: Predecessor GUI Item** is displayed in the **Component** column in the items form, and other associated data populates other columns on the form (including the Active Date and Inactive Date taken from the Engineering Change Approval screen).

62   Press the **Enter** key repeatedly until the cursor is positioned in the **ACT DATE** column for the **Training: Predecessor GUI Item**.

63   Type "**/M**" (for **M**odify).
- The screen displays a blank entry field for the **ACT DATE** for the item, and the bottom line menu indicates MODIFY mode, enabling changes to the item information.

64   Type the Active Date you noted in step 58, using format mm/dd/yy, and then press the **Enter** key.
- The cursor moves to the **INACT DATE** column.
- Note: The entry field is not blank, but the system is still in the MODIFY mode.

65   Type the date that the item is to become obsolete (the same as the **ACTIVE DATE** for the new item), and then press the **Enter** key.
- The Active and Inactive Dates are changed.

66   Press the **F3** key to exit from the MODIFY mode.
- The bottom line menu displays available choices, including **Q** (for **Q**uit).

67   Type "**Q**" (for **Q**uit) to exit from the Items screen.
- The Engineering Change Entry form is displayed, at the Parent Part for which you just entered items data.

68   Type "**Q**" (for **Q**uit).
- The Bill of Material Menu is displayed.

69   Press the **F8** key.
- XRP-II is closed.

Inventory/Logistical Management (ILM)

The ILM system is used to enter and maintain property records for all items in the ECS inventory. This includes not only equipment items tagged with physical serial tags, but also non-physical items which, although they cannot be physically tagged, must be tracked as inventory items (e.g., software items). At each site, each item requiring serial tag control, whether an actual tag control or an assigned number provided by the system, must have an Equipment Identification Number (EIN). The illustration at the upper left of Figure 23 shows the ILM EIN Entry screen in the **A**DD mode, as it appears when **EIN Entry** is selected from the ILM EIN Menu. When entries are completed and the **A**DD mode is exited, the information is available by selecting **EIN Manager** from the ILM EIN Menu to access a screen like that shown at the lower right of the figure.

Figure 23. ILM Screens: EIN Entry (Upper Left) and EIN Manager (Lower Right)

Once assigned an EIN, an item is tracked by ILM, with all movement and status recorded throughout its life. The ILM system also provides reports for hard copy requirements. To understand the use of the ILM software, consider as an example the arrival at your site of a new RAID (Redundant Array of Inexpensive Disks) unit as an upgrade to the science processor. To update the ILM record for our example, use the following procedure.

Update the Inventory/Logistical Management Record using the ILM Tool

1   On workstation *x0mss##*, at the UNIX prompt in a terminal window, type **pcs** *<ipaddress>* **xterm** at a UNIX command prompt and then press the **Return** key.

- NOTE: The *x* in the workstation name will be a letter designating your site: **g** = GSFC, **m** = SMC, **l** = LaRC, **e** = EDC, **n** = NSIDC, **o** = ORNL, **a** = ASF, **j** = JPL; the *##* will be an identifying two-digit number (e.g., **n0mss02** indicates a management services subsystem workstation at NSIDC). If you access the workstation through a secure shell remote login (ssh), you must enter **xhost <remote_workstation_name>** and enter **setenv DISPLAY <local_workstation IP address>:0.0** prior to the ssh before entering the command after the ssh. The *<ipaddress>* is the ip address of *x0mss##*, and **xterm** is required when entering this command on a Sun terminal.
- A script is executed which determines the operator's terminal type from the environment, prompts for a terminal ID, and establishes a Baseline Manager/ ILM operating environment. XRP-II is then started and the **Main Screen** is displayed.

2   Type the number **2** (for **ILM Main Menu**) and press the **Enter** key.

- The **ILM Main Menu** screen is displayed.

3   Type the number **1** (for **EIN Menu**) and press the **Enter** key.
- The **EIN Menu** screen is displayed.

4   Type the number **1** (for **EIN Entry**) and press the **Enter** key.
- The **EIN Entry** screen is displayed; the system is in the **A**dd mode, the cursor is at the **EIN:** entry field, and the message "RETURN for next" is displayed.

5   The **EIN:** field is for the Equipment Identification Number from the silver identification tag attached to a hardware item (in our example, a RAID unit). For this exercise, type **0000TTTT** as the EIN. If the item were an item with no physical tag number (e.g., a software item, you could just press the **Enter** key to let the system generate a number.
- The **EIN** is displayed in the entry field and the cursor moves to the **SERIAL NUMBER:** field, followed by the message "RETURN for next."
- The system provides a **Tran Code:**, the current year as default for **YEAR MFG:**, the **NASA CONTRACT:** (NAS5-60000), and a **LOCATION:**.

6   For this exercise, type **S99999** and then press the **Enter** key. For an item with no serial number, you could just press the **Enter** key to accept the next system-generated serial number.
- The **Serial Number** is displayed in the entry field and the cursor moves to the **OEM PART NUMBER:** field.

7   Type "**/Z**" to zoom out to a table listing OEM Part Numbers for selection.
- The data for the first OEM Part Number are displayed. You may scroll up and down the list by typing "**N**" (for Next) or "**P**" (for Prior), or, you may type "**V**" to switch the view to display the data for several OEM Parts in columns.
- Note: To use this zoom-out capability to select a part number, the part and associated data must have been entered previously (using the OEM Part Numbers screen, accessible through the ILM Master Menu). For this exercise, data have been entered for an OEM Part "M&O TRAINING."

8   Type "**S**" to initiate a search for selected items.
- A message is displayed instructing "SELECT: enter field(s) to be selected then ▮F5▮-start (▮-clear ▮-cancel) . . ." followed by a field to enter the search string.

9   To search the list for the name of the OEM Part (**M&O TRAINING**) you want to enter on the EIN Entry Screen, Type "**M&O***" and then press the **F5** key.
- The selection zoom box displays the OEM Part, MFG, and OEM Model for the item(s) beginning with "**M&O**," including **M&O TRAINING**.

10   If necessary, use the keyboard arrow keys to scroll up or down the list until the cursor is at the desired entry (**M&O TRAINING**); then type "**T**" (for **T**ag) to tag the selection for entry into the **OEM PART NUMBER:** field on the EIN Entry screen.
- The tagged entry is highlighted.

11   Type "**Q**" (for **Q**uit).
- The number or entry (in this case "M&O TRAINING") for the OEM PART is displayed in the **OEM PART NUMBER:** field.
- The cursor moves to the **OEM DESCRIPTION:** field, which now has data filled in from the prior entry of OEM Part data.

625-CD-012-002

- Other OEM Part data (i.e., **HDWSFT CODE:**, **MODEL/VERSION:**, **MFG:**, **VENDOR:**, **UNIT COST:**, and **YEAR MFG:** (which now has the default current year replaced with the year entered for the OEM Part).

12 To accept the data filled in the **OEM DESCRIPTION:** field, just press the **Enter** key.
- The cursor moves to the **BASELINE ID:** field, which is an entry to identify an equivalent item contained in the Baseline Manager (BLM).

13 Type "**/Z**" to zoom out to a table listing Control Items, Names, and Mnemonics from the BLM for selection.

14 Type "**S**" to initiate a search for selected items.
- A message is displayed instructing "SELECT: enter field(s) to be selected then ▮F5▮-start (▮-clear ▮-cancel) . . ." followed by a field to enter the search string.

15 To move the selection field under the Mnemonic column in the zoom box, press the **Enter** key twice.
- The field for entry of the search string moves to the right, under the Mnemonic column.

16 To search the list for the name of the relevant baseline item (in this case, **RAID**) so that you can enter its Control Item ID Number on the EIN Entry Screen, Type "**RAID***" and then press the **F5** key.
- The selection zoom box displays the Control Item ID, Name, Mnemonic, and (if you type "**R**" to scroll **R**ight) other fields in the Control Items Query for the item(s) beginning with "**RAID**."

17 If necessary, use the keyboard arrow keys to scroll up or down the list until the cursor is at the Control Item ID for the desired item . For this exercise, select the first item on the list; then type "**T**" (for **T**ag) to tag the selection for entry into the **BASELINE ID:** field on the EIN Entry screen.
- The tagged entry is highlighted.
- NOTE: In an actual ILM entry, you may not be able to tell from information displayed whether one of the listed BLM items is appropriate. You will need to query the BLM data prior to making the ILM entry to identify the correct item and note its identification so you can select it during the ILM entry.

18 Type "**Q**" (for **Q**uit).
- The Control Item ID number for the baseline item is displayed in the **BASELINE ID:** field.
- The cursor moves to the **ECS NAME:** field.

19 Type a name that the item will be known by (e.g., **RAID SPRG UPGRADE**) and then press the **Enter** key
- The cursor moves to the **HDWSFT CODE:** field.

20 The **HDWSFT CODE:** field has an entry filled in from the prior selection of the OEM Part Number; just press the **Enter** key.
- The operator may fill or change this field by typing "**/Z**" to zoom to a Hardware/Software data file for selection of codes that have previously been entered using the Hardware/Software Codes screen accessible through the ILM Master Menu.
- The cursor moves to the **MODEL/VERSION:** field.

21   The **MODEL/VERSION:** field has an entry filled in from the prior selection of the OEM Part Number; just press the **Enter** key.
- The cursor moves to the **YEAR MFG:** field.

22   The **YEAR MFG:** field has an entry filled in from the prior selection of the OEM Part Number; just press the **Enter** key.
- The cursor moves to the **SOFTWARE LIC NUM:** field.

23   Because this exercise addresses a hardware change, there is no license number required; just press the **Enter** key.
- The screen displays a Maintenance Vendor zoom box showing three-letter codes, names, and terms for vendors, permitting selection for the **MAINT VENDOR:** field.

24   For this exercise, type "**N**" and/or use the down arrow key on the keyboard until the cursor is at the three-letter code **SGI**; then type "**T**" (for **T**ag) to tag the selection for entry into the **MAINT VENDOR:** field on the EIN Entry screen.
- The tagged entry is highlighted.

25   Type "**Q**" (for **Q**uit).
- The zoom box is closed and the selected three-letter code for the maintenance vendor is displayed in the **MAINT VENDOR:** field.
- The cursor remains at the **MAINT VENDOR:** field.

26   Press the **Enter** key.
- The screen displays a Maintenance Contracts zoom box showing contract, vendor, and other data in a list that has been previously entered using the Maintenance Contracts screen accessible through the ILM Maintenance Menu, permitting selection for the **MAINT CONTRACT:** field.

27   If the list shows an entry for SGI, you can use the keyboard arrow keys to scroll to that entry, and then type "**T**" to tag the entry before typing "**Q**." To leave the **MAINT CONTRACT:** field blank for this exercise, just type "**Q**" (to **Q**uit the zoom box selection).
- The zoom box is closed.
- The cursor remains at the **MAINT CONTRACT:** field.

28   Press the **Enter** key.
- The cursor moves to the **STATUS CODE:** field, and a default entry "**R**" (for **R**eceived) appears in the field.

29   Type "**/Z**" to zoom out to a table listing status codes with their descriptions for selection.

30   The keyboard arrow keys may be used if necessary to scroll up and down the list; with the cursor at **I** (for **I**nstalled), type "**T**" (for **T**ag) to tag the selection for entry into the **STATUS CODE:** field on the EIN Entry screen.
- The tagged entry is highlighted.

31   Type "**Q**" (for **Q**uit).
- The selected Status Code is displayed in the **STATUS CODE:** field.
- The cursor moves to the **NASA CONTRACT:** field, which shows a default entry of **NAS5-60000**.

32   To leave the default NASA Contract entry, just press the **Enter** key.
- The cursor moves to the **RELEASE CODE:** field.

33 Type "**R4**" (for **Release 4**), and then press the **Enter** key.
  - The cursor moves to the **PO Number:** field; normally, this field will have an entry filled in by the Receiving system to designate the Purchase Order against which the item was received.
34 For this exercise, press the **Enter** key to leave the **PO Number:** field blank.
  - The cursor moves to the **LOCATION:** field.
35 Type "**/Z**" to zoom out to a table listing Location ID codes and other data for ECS sites to permit selection.
36 The keyboard arrow keys may be used if necessary to scroll up and down the list; with the cursor at your site, type "**T**" (for **T**ag) to tag the selection for entry into the **LOCATION:** field on the EIN Entry screen.
  - The tagged entry is highlighted.
37 Type "**Q**" (for **Q**uit).
  - The selected Location ID Code is displayed in the **LOCATION:** field.
  - The cursor moves to the **BUILDING:** field.
38 The **BUILDING:** field can be used to designate the building number within the site where the item is; for this exercise, type an appropriate building number or leave the field blank, and then press the **Enter** key.
  - The cursor moves to the **ROOM:** field.
39 The **ROOM:** field can be used to designate the room number within the building where the item is; for this exercise, type an appropriate room number or leave the field blank, and then press the **Enter** key.
  - The cursor moves to the **USER:** field.
40 The **USER:** field can be used for a code to designate the person who has the item. If employee data has been previously entered using the Employee Manager screen accessible through the ILM Master Menu, the operator can type "**/Z**" to zoom to a list of User IDs to select one to fill this field. For this exercise, leave the field blank and just press the **Enter** key.
  - The cursor moves to the **UNIT COST:** field.
41 The **UNIT COST:** field has an entry filled in from the prior selection of the OEM Part Number; just press the **Enter** key.
  - The cursor moves to the **NOTE:** field.
42 The **NOTE:** field can be used to enter a 60-character note attached to the item (e.g., to identify something unique about the item). For this exercise, type "**Item entered for training only**" and then press the **Enter** key.
  - The cursor moves to the **WARRANTY EXP DATE:** field.
43 The **WARRANTY EXP DATE:** field is used to specify the end date of the warranty period; it defaults to 365 days from the date of entry. To leave the default entry in the field for this exercise, just press the **Enter** key.
  - The EIN Entry screen exits the **A**dd mode; the bottom line menu reflects available choices.
44 Type "**Q**" (for (**Q**uit).
  - The **EIN Menu** is displayed.

45   Press the **F8** key to exit.
- XRP-II is closed.

This page intentionally left blank.

Practical Exercise

Introduction

This exercise is designed to practice key elements of the Configuration Management procedures. Perform the tasks identified in the exercise.

Equipment and Materials

One ECS workstation.

Mission Operation Procedures for the ECS Project, 611-CD-004-004.

Custom Software Problem

This exercise involves a problem with custom software developed for ECS and maintained by the SEO.

A science user trying to use one of the ECS toolkits experiences an inability to get the desired results when using the toolkit with another ECS application. The science user reports the problem to the site's User Services Desk. The User Services Desk records the information and opens a Trouble Ticket (TT) in the TTS. The TT is routed to the site Sustaining Engineer(s) for diagnosis. The Sustaining Engineer verifies that the toolkit's interface to the other ECS application does not provide the desired results and identifies two sources of error: a) the user is attempting a procedure that has not typically been supported at this site and that requires a display hardware upgrade, and b) there are source statements in the software that are in error. The engineer estimates that it will take one person-month to correct and test the application.

1. Generate a CCR for the display hardware upgrade from a Wyse Model WY-150 monochrome display monitor to a Silicon Graphics Model GDM-20D11 Color Graphic Display.
2. Generate a CCR for the software change.
3. Generate a CCR to document the hardware and software changes.
4. Prepare distribution lists for review of the proposed changes.
5. Use ClearCase™ to process the transfer and installation of the software patch.
6. Log in the new software file using the Baseline Manager.
7. Perform the required Change Control Accounting for the software and hardware changes.
8. Assume delivery of the new display monitor and create updates to the Inventory/Logistical Management records using the ILM tool.

This page intentionally left blank.

625-CD-012-002

Slide Presentation•

Slide Presentation Description

The following slide presentation represents the slides used by the instructor during the conduct of this lesson.

This page intentionally left blank.